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UNIVERSITY OF ILLINOIS BULLETIN

VOL. V OCTOBER 14, 1907 No. 7

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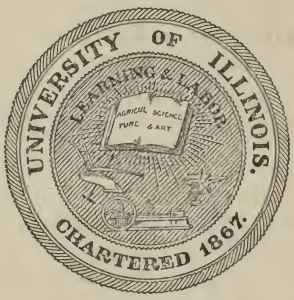
THE GRADUATE SCHOOL

OF THE

UNIVERSITY OF ILLINOIS

1907—1908



URBANA, ILL., 1907.

Published by the University.

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UNIVERSITY OF ILLINOIS SUMMER SESSION

June 15 to Aug 14, 1908.

Courses in Agriculture, Art and Design, Botany, Chemistry, General Engineering Drawing, Economics, Education, English and Rhetoric, French, German, History, Household Science, Latin, Manual Training ,Mathematics, Theoretical and Applied Mechanics, Mechanical Engineering, Philosophy, Physics, Physical Geography, Physical Training, Political Science, Psychology, Spanish and Zoology.

These courses are intended for teachers and college students. A few of them are advanced courses, and may be credited toward the degree of M. A. by persons approved by the Dean of the Graduate School. Instruction is given by members of the regular University Faculty. The tuition for the session is $12.00. Free scholarships are offered to all high school teachers in Illinois, and to all other teachers in the State who are able to matriculate in the University. Prospective students who desire scholarships must perfect their arrangements before the first of June.

For bulletin and further information address

THOMAS ARKLE CLARK, Director,
Urbana, Illinois.

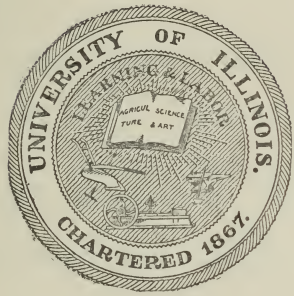
THE GRADUATE SCHOOL

OF THE

UNIVERSITY OF ILLINOIS

ANNOUNCEMENT FOR

1907—1908



URBANA, ILLINOIS

Published by the University

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*There are at present two vacancies in the Board.

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GRADUATE SUMMER SESSION IN HISTORY

Special opportunities are also offered for advanced instruction in the Summer School of History. Professor James Harvey Robinson of Columbia University will conduct a graduate course in European history; Professor Edward P. Cheyney, of the University of Pennsylvania will give a course in English history; and members of the regular staff of the department will offer other advanced courses in English and American history. For further information address

E. B. Greene, Director,
University Hall.

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THE UNIVERSITY CALENDAR
1907–1908
For all Departments at Urbana

1907 — First Semester

Sept. 11, Wednesday 8 a.m.	Entrance Examinations begin.
Sept. 16, 17, Mon. and Tues.	Registration Days.
Sept. 18, Wednesday, 8 a. m.	Instruction begins.
Nov. 4, Monday.	Latest day for Announcing Theses Subjects.
Nov. 27, Wednesday, 5 p. m.	Thanksgiving Recess begins.
Dec. 1 Monday, 8 a. m.	Instruction begins.
Dec. 21, Saturday, 5 p. m.	Holiday Recess begins.

1908

Jan. 3, Friday, 8 a. m.	Instruction begins.
Jan. 30, Thursday, 5 p. m.	First Semester ends.

Second Semester

Feb. 3, Monday, 8 a. m.	Instruction begins.
April 16, Thursday, 5 p. m.	Easter Recess begins.
April 21, Tuesday, 8 a. m.	Instruction begins.
May 15, Friday evening.	Interscholastic Oratorical Contest.
May 14, 15, 16, Thurs. to Sat.	Public School Art Exhibit.
May 16, Saturday.	Interscholastic Athletic Meet.
May 26, Tuesday.	Hazelton Prize Drill. Annual Inspection. Company Competitive Drill.
May 29, Friday.	Military Day.
June 1, Monday.	Latest day for Acceptance of Theses.
June 7, Sunday.	Baccalaureate Address.
June 8, Monday.	Class Day.

June 9, Tuesday.	Alumni Day.
June 10, Wednesday.	Thirty-Seventh Annual Commencement.

Summer Session

1907	
June 17, Monday.	Instruction begins.
August 16, Friday.	Session ends.
1908	
June 15, Monday.	Instruction begins.
August 14, Friday.	Session ends.

First Semester, 1908–1909

Sept. 16, Wednesday, 8 a. m.	Entrance Examinations begin.
Sept. 21, 22, Monday, 8 a. m. to 5 p. m. and Tuesday.	Registration Days.
Sept. 23, Wednesday 8 a. m.	Instruction begins.
Nov. 2, Monday.	Latest day for Announcing Theses Subjects.
Nov. 25, Wednesday, 5 p. m.	Thanksgiving Recess begins.
Nov. 30, Monday, 8 a. m.	Instruction begins.
Dec. 22, Tuesday, 5 p. m.	Holiday Recess begins.
1909	
Jan. 4, Monday, 8 a. m.	Instruction begins.
Jan. 29, Friday.	First Semester ends.

THE FACULTY

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EDWARD CHARLES SCHMIDT, M. E., *Associate Professor of Railway Engineering.*

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CHARLES SPENCER CRANDALL, *Associate Professor of Pomology.*

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GUY A. TAWNEY, PH. D., *Assistant Prof. of Philosophy.*

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PHILIP BOVIER HAWK, PH. D., *Assistant Professor of Physiological Chemistry.*

CARL EMIL LEE, B. S., *Assistant Professor in Dairy Manufactures.*

LOUIE HENRIE SMITH, PH. D., *Assistant Professor of Plant Breeding.*

JUSTUS W. FOLSOM, SC. D., *Associate in Entomology.*

FRANK WILLIAM SCOTT, A. M., *Associate in English.*

LOUIS D. HALL, M. S., *Associate in Animal Husbandry.*

THACHER HOWLAND GUILD, A. M., *Associate in English.*

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AMOS WILLIAM PETERS, PH. D., *Associate in Zoology.*

ARTHUR R. SEYMOUR, PH. D., *Associate in Spanish.*

CHARLES H. SISAM, PH. D., *Associate in Mathematics.*

HERBERT LUCIUS WHITTEMORE, B. S., *Associate in Applied Mechanics.*

HAMILTON FORD ALLEN, PH. D., *Associate in Classics.*

CLARENCE E. BALKE, PH. D., *Associate in Chemistry.*

EDWARD JOSEPH FORTIER, A. B., *Associate in Romance Languages.*

WILLIS B. HOLMES, PH. D., *Associate in Chemistry.*

LAURENCE M. LARSON, PH. D. *Associate in History.*

JOHN HANCOCK MCCLELLAN, PH. D., *Associate in Zoology.*

LOUIS JOHN PAETOW, PH. D., *Associate in History.*

STUART PRATT SHERMAN, PH. D., *Associate in English.*

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CLIFFORD WILLIS, M. S., *Instructor in Soil Physics.*

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OTIS ORION STANLEY, M. S., M. D., *Instructor in Physiology.*

FREDERIC WALTON CARPENTER, PH. D., *Instructor in Zoology.*

LEWIS IRVING NEIKIRK, PH. D., *Instructor in Mathematics.*

EDWARD LEE NORTON, PH. D., *Instructor in Education.*

HENRY ALLAN GLEASON, PH. D., *Instructor in Botany.*

ARTHUR ROBERT CRATHORNE, PH. D., *Instructor in Mathematics.*

JOSEF WIEHR, PH. D., *Instructor in German.*

FRED KUHLMANN, PH. D., *Instructor in Psychology.*

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JOHN GIFFIN THOMPSON, PH. D., *Instructor in Economics.*

ELMER HOWARD WILLIAMS, A. M., *Instructor in Physics.*

GEORGE MCPHAIL SMITH, PH. D., *Instructor in Chemistry.*

The Executive Faculty

EDMUND JANES JAMES, PH. D., LL. D., PRESIDENT OF THE UNIVERSITY

DAVID KINLEY, PH. D., *Professor of Economics and Dean of the Graduate School.*

THOMAS JONATHAN BURRILL, PH. D., LL. D., *Vice President, Professor of Botany.*

STEPHEN ALFRED FORBES, PH. D., LL. D., *Director of the Illinois State Laboratory of Natural History and State Entomologist, Professor of Zoölogy.*

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GUSTAF E. KARSTEN, PH. D., *Head of the Department of Modern Languages, Professor of the German Language and Literature.*

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GUY STANTON FORD, PH. D., *Professor of Modern European History.*

CHESTER NOYES GREENOUGH, PH. D., *Professor of English.*

GEORGE ABRAM MILLER, PH. D., *Professor of Mathematics.*

LOUIE HENRIE SMITH, PH. D., *Assistant Professor of Plant Breeding, Assistant Chief of Plant Breeding in the Agricultural Experiment Station.*

WILLIAM ALBERT NOYES, PH. D., *Professor of Chemistry and Director of the Chemical Laboratory.*

HISTORY AND ORGANIZATION

Although the University of Illinois has for many years offered facilities for study and research in various lines to advanced students, graduate work was undertaken under the name of the Graduate School for the first time in 1892. Beginning with that year each department offered such work as it could, without the organization of a separate Graduate School Faculty. In 1894 the administration of the school was vested in the Council of Administration and the Vice President of the University became Dean of the school. As yet, however, the School had no executive faculty separate from the faculties of the undergraduate colleges.

In 1906 the Graduate School was organized as a separate faculty, consisting of a dean and members of the University faculty assigned to this duty by the President. No means of support, however, were provided, separate from those provided for undergraduate work. In the winter of 1906-7, the Forty-fifth General Assembly of the State passed an act appropriating $50,000 per year for the support of a Graduate School of the Arts and Sciences in the State University. This is the first time in history in which a State Legislature has made an appropriation for such a purpose and the act is noteworthy as committing a democratic government specifically to the promotion of advanced scholarship and research in lines which are not primarily "practical". The executive faculty was accordingly organized, and steps taken to put such of the departments as were already prepared to do advanced work in suitable condition.

By act of the Trustees the faculty of the Graduate School includes all members of the University faculty who actually are giving instruction to graduate students. The affairs of the School, however, are in charge of the executive faculty, consisting of the dean and ten other members.

ADMISSION

Admission to the Graduate School is conditioned upon the presentation of credentials showing that the applicant holds a first degree either from the University of Illinois or from some other college or university of approved standing. Admission to particular graduate courses or departments may be secured only by those who have had the requisite undergraduate work

in those courses or departments. If any student wishes to take graduate work in a department in which he has not had the necessary preliminary undergraduate training, he must secure this preparation in the undergraduate courses without credit and without reference to an advanced degree.

REGISTRATION

In order to be enrolled as a member of the Graduate School a student must be doing what is really graduate work. The mere possession of a first degree does not entitle a student to be enrolled in the Graduate School, if the courses which he is taking are in reality undergraduate courses.

Each graduate student must register when he first connects himself with the University and afterwards at the beginning of each year. The first registration, however, or that upon entrance, is permitted only after the student's application for admission to the Graduate School, setting forth his educational attainments, has been duly approved.

Admission to candidacy for degrees is granted only to graduates of colleges or scientific schools of standing equivalent to that of the University of Illinois.

Students of mature age who satisfy the dean of the school and the officers of the departments in which they wish to work of their earnestness of purpose and special fitness, may be permitted to take work in the Graduate School without reference to candidacy for a degree. In order to secure this permission, however, a candidate must have had such preliminary preparation for the work he wishes to take up as would justify his admission to the Graduate School as a candidate for a degree if he could meet the formal requirements fully.

Application blanks for admission may be secured from the Dean of the Graduate School or from the registrar of the University, and these, properly filled out, should be filed, with such documentary matter as the candidate can offer showing qualifications for membership, not later than the registration days in September.

Excepting as noted below, continuous residence and study are required of all members of the Graduate School, unless they are granted leave of absence by the Dean upon application and upon approval of the professors in charge of their work for the

purpose of carrying on elsewhere studies or investigations in the line of the work for their degrees.

Graduates of the University of Illinois, but no others, may be permitted to carry on graduate work for a second, or master's, degree *in absentia.* All such students must make out the usual application for admission, must submit their proposed courses of study to the Dean, whose approval, together with that of the professor in charge of the work, is necessary, before the student can be enrolled. Students who wish to pursue their graduate work *in absentia* are required to submit evidence that they have at their place of residence sufficient equipment in the way of libraries or apparatus to pursue the course of study proposed.

CHARACTER OF GRADUATE WORK

The work expected from graduate students is different in character from that usually demanded from undergraduates. Regularity of attendance, wide knowledge and ability to meet examination tests are of secondary importance. The principal aim of graduate study is the development of the power of independent work and the promotion of the spirit of research. Consequently, before he can get his degree, each graduate student is expected to show that he has acquired the power of independent research. Of course, in addition, each candidate is expected to have a wide knowledge of his subject and of related fields of work. Students are therefore expected to do assigned reading and to attend lectures for the purpose of getting advice and guidance which will be of use to them in their private research. That is, students in the Graduate School are required to attend a minimum of lecture, class or laboratory, courses. It is not intended, however, that the graduate student shall get from these courses all the knowledge and training necessary to meet the requirements for his degree. The class, lecture, or laboratory, course is intended to present the principles or theory of the subject and serve as a model or guide to the student in his private reading and research. While, therefore, every student is required to attend a certain number of exercises, he is expected to prepare himself by his private study in the larger part of the work necessary for his examinations.

Accordingly, each candidate for the master's degree is required to attend a minimum of four class, lecture, or laboratory, ex-

ercises, per week, in the first year of his graduate study, and in no case is he permitted during his course to attend more than twelve.

It is desirable that each student shall get thorough training in some field of knowledge and at the same time avoid too narrow specialization. To accomplish this purpose each graduate student, candidate for the doctor's degree, is required to choose three subjects for study and final examination. By "subject" is meant the field of knowledge of a department, or such part thereof as constitutes a separate and sufficiently extended field of study. The field of knowledge in which the student desires to attain his highest proficiency and widest knowledge is, for convenience, called his "major" subject. The other two are called the "first minor" and "second minor."

It is in connection with his major or principal subject that the candidate must prepare the thesis or dissertation which is required of all candidates for the doctorate, and of all candidates for the master's degree unless excused.

Consequently, a single course of study in any department can not be selected as a major or minor. The first minor should be a subject somewhat closely related to the major; but the second minor may be in an entirely separate field and of a different scientific or literary character.

The student is expected to put at least half his time on his major field of study and the rest of the time may be divided between his minor subjects, according to circumstances.

When a candidate chooses any subject as his major and a division of that subject as his first minor he is not permitted to choose as a second minor any division of work in that same department, excepting by special vote of the executive faculty of the School.

The candidate's list of subjects must receive the approval of the head of the department in which he chooses his major work and of the Dean of the School.

DEGREES

Master of Arts and Master of Science.—Candidates for the degree of Master of Arts or Master of Science are required to do one full year's work in residence. Graduates of this University are permitted to secure their degrees on doing

this amount of work *in absentia*, but they may not secure the degree in less than three years. Work *in absentia* is not permitted unless the student satisfies the Dean and the professors in charge of his work that he has the facilities to do it properly. Each candidate for a master's degree may do all his work in one subject or field of study, or he may select a major and one minor, or a major and two minors, as described above. In any case, he must do at least half his work on his major subject. Each candidate for the master's degree is also required to present an essay on some subject approved by the professor in charge of his major work, and the Dean of the School, unless by vote of the Executive Faculty of the Graduate School the student is permitted to take a course for the degree without offering a thesis.

Graduates of this University who are working for a master's degree *in absentia* must present themselves at the University for examination not later that the first Monday of June of the year in which they wish their degree.

The mention of one year as the required residence period does not imply that a degree will be obtained simply by passing the examinations on the work done in that year. While the work of the candidate for a master's degree consists largely in the broadening of his knowledge of his subjects of study, and not, to so great an extent, at any rate, as in the case of the candidate for the doctorate, in the development of the power of original research, nevertheless, the work of the candidate must be of a high order and must be such as to satisfy the faculty that the candidate has done more than merely acquire a certain amount of knowledge by rote.

As indicated by what has been said, the minimum period of study for the master's degree is one year, and usually the degree may be attained within that period. If the candidate, however is inadequately prepared, or if his time and strength are impaired during the first year of residence by other matters, he will be required to spend a longer time.

Doctor of Philosophy.—The requirements for the degree of Doctor of Philosophy are a thorough mastery of a selected field of study, evidence of the power of independent investigation in this field, a broad knowledge of the wider field of study of which this major subject is a part, a general acquaintance

with related fields of knowledge and a mastery of all branches of study which are necessary to a full knowledge of the main subject. Each student who is seeking this degree is expected to choose a major subject, or field of study, and a first and second minor. The major subject is the field in which the student expects to become expert and an authority. The first minor must be a subject closely related to the major and may, under certain conditions and with proper approval, be a subdivision of the major field of study. The second minor must be chosen outside of the major field of study.

The power of independent research must be proven by the production of a thesis on some topic within the field of the major subject of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or so many of them as may wish to question him about it, at a meeting called for the purpose, in the spring of the year in which he expects to take his degree.

The minimum period of study required for securing the degree of Doctor of Philosophy is three years, and if a candidate of ability enters the Graduate School fully qualified to take up immediately the work leading to a doctorate and devotes all his time to the pursuit of his purpose, he will usually succeed in getting his degree at the end of three years. If, however, he begins his work without full preparation, or if his strength is divided, he will be required to spend a longer time. In any case, the degree is conferred not for residence during a certain period, but for scholarly attainments and power of investigation, as proven by thesis and examination.

Towards the end of his second year of study the candidate for the degree must submit to a preliminary examination conducted by the members of the faculty with whom he is doing his principal work, in order to determine whether he will be advised to offer himself at the end of the following year as a candidate for the degree. This examination is partly oral, and may be wholly so. At this time, or before, the candidate will be required to demonstrate his ability to read French and German, and also any other language which may be needed for the prosecution of his work.

Towards the end of the third year, or the year in which the candidate expects to come up for his degree, he must submit to

a final examination by a committee appointed by the Dean of the Graduate School. This examination will be partly written. The candidate will also have, however, an oral examination. These examinations will not be confined to the courses which the candidate has attended in the University of Illinois only, if he has done part of his work elsewhere; nor even to the field covered by the courses specifically taken in this or other universities; but will be so conducted as to determine whether the candidate has a satisfactory grasp of his major subject as a whole and a general acquaintance with the broad fields of knowledge represented by his major and minor subjects.

The thesis must be printed and one hundred copies deposited in the library of the University before the degree is conferred.

If, for any reason, the thesis can not be printed and one hundred copies deposited before Commencement time, the candidate must, before the first Monday in June, deposit a bond acceptable to the Comptroller of the University and the Dean of the Graduate School for the cost of printing his thesis, or such part thereof as may be regarded as sufficient to meet the requirements of the rules.

The title page of each thesis must bear the words "Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in—(here put the major subject), in the Graduate School of the University of Illinois." The title page shall also contain the full name of the author, the full title of the thesis, the year of imprint, and if a reprint, the title, volume and statement of the pagination of the volume from which it was reprinted. Each thesis must have an appendix giving a short educational history of the candidate, including the institutions he has attended, his degrees and honors, the titles of his publications, and such other matters as may be pertinent.

Before the candidate is admitted to the final examination and the defense of his thesis, he may be required to take any other examination, oral or written, that is thought proper by the various departments in which he has studied. On the results of the preliminary examination in the spring of his second year of study will depend the admission of the student to candidacy for the degree. If after having been thus admitted as a candidate for the degree, he fails in the third year of his study to meet the expectations of the professors in charge of his work,

or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

CHARACTER OF EXAMINATIONS

The final examination in the major and minor subjects may not be divided. The examination must be taken all at one time even though it requires several sessions.

Students can not be admitted to candidacy for the degree of Doctor of Philosophy until they have proven their ability to meet the language requirements. They must therefore give evidence of their ability to read the necessary languages with sufficient facility as early as the time of the preliminary examination in the spring of the second year of their study. Excepting where the chosen field of study itself includes the languages, the examinations are conducted so as to determine whether the student is able to use the language as a tool for the purpose of investigation in his chosen fields of study.

Students are warned against restricting themselves merely to the courses prescribed or suggested by the departments in which they are studying. Each student is expected to do a wide range of private reading and study; and in many cases will find it advisable to take one or more courses of lectures quite outside the fields covered by their chosen subjects.

The thesis must be the result of the author's own investigation. No display of scholarship or acquaintance with the literature of the subject will secure the acceptance of the thesis if it does not show real power of research.

Candidates should note that credit is not given for work done in other universities, excepting in the sense that their residence at other institutions is counted towards the residence requirement for the doctor's degree. The candidate is examined here on the subjects offered by him for the advanced degree.

GRADUATE WORK IN ENGINEERING

The statements thus far made apply to candidates for higher degrees in engineering as well as in other lines. There are certain regulations, however, concerning engineering work which do not apply to other lines and are therefore set forth here by themselves.

Candidates for second degrees in engineering *must* confine themselves to one subject, their major. Having chosen their major subject, engineering students must then select under the advice of the head of the department of major work one or more primary and one or more secondary subjects, as listed in Courses for Graduates under each of the engineering subjects described in the General Description of Courses. For example: a student may elect as his major, civil engineering. He will then choose one of the primary and one of the secondary courses listed under Courses for Graduates in Civil Engineering.

The regulations for the doctor's degree in engineering are the same as in other departments.

The engineering degrees offered are as follows:

Master of Architecture after Bachelor of Science in the courses in Architecture and Architectual Engineering.

Civil Engineer after Bachelor of Science in the courses in Civil Engineering.

Electrical Engineer after Bachelor of Science in the course in Electrical Engineering.

Mechanical Engineer after Bachelor of Science in the course in Mechanical Engineering.

FELLOWSHIPS AND SCHOLARSHIPS

A number of fellowships and scholarships has been estabished by the Trustees of the University. To first year graduate students of ability and promise there is open a number of scholarships with a stipend of $250 each and freedom from tuition and incidental fees. To second and third year graduate students, that is, those who have had one or two years of graduate study, are open fellowships with a stipend varying from $300 to $500 with freedom from tuition and incidental fees. The larger stipend is given only to a student who is expected to take his degree within the year. Each holder of a fellowship must pay the matriculation fee of ten dollars unless he holds a first degree from the University of Illinois.

These scholarships and fellowships are open only to students of unusual ability and promise. Fellowships with the larger stipend will not be awarded to any one who can not submit satisfactory evidence of possessing the power of independent research.

Candidates for these scholarships and fellowships must be graduates of the University of Illinois, or of colleges or universities having similar requirements for bachelor's degrees.

Applications must be made upon blanks provided for the purpose, to be obtained from the Dean of the Graduate School. These application forms should be addressed to the Dean of the Graduate School as early as possible in February of the academic year preceding that for which the fellowship is desired.

Scholarships and fellowships are good for one year but may be renewed for a second or a third year in special cases. An appointment as honorary fellow, without stipend, may be made as specified for paid fellowships in the case of anyone who has held a regular fellowship and has shown distinguished merit in his work.

Applications for scholarships and fellowships should be accompanied with full information concerning the applicant, and with any written or printed essays or results of investigation which they can submit.

Fellows are members of the Graduate School and have all the privileges and bear all the responsibilities of such membership.

Nominations to fellowships are made upon the grounds of worthiness of character, scholastic attainments, and promise of success in the principal line of study or research to which the candidate proposes to devote himself.

Applicants for fellowships are required to agree to send the Dean of the Graduate School promptly notice of their acceptance or refusal; and to agree further, that, if accepted, the fellowship will not be resigned to take a fellowship in any other institution during the year for which it is awarded.

RESEARCH FELLOWSHIPS IN THE ENGINEERING EXPERIMENT STATION

The Engineering Experiment Station, devoted entirely to research, was established by action of the Board of Trustees, December 8, 1903. It is the first and, so far as known, the only experiment station connected with any college of engineering in this country. Its purposes are the stimulation and elevation of engineering education, and the study of problems of special importance to professional engineers and to the manufacturing,

railway, mining, and industrial interests of the state and the country.

Ten fellowships, each of five hundred dollars a year, have been established in the Engineering Experiment Station. Applicants to whom these fellowships are awarded are required to agree to hold them for two years, devoting a part of their time to work in the Engineering Experiment Station of the University. Application for these should be made to the Director of the Engineering Experiment Station.

Holders of these fellowships are subject to the same University regulations as holders of other fellowships.

LIBRARIES

The general University library, the library of the State Laboratory of Natural History, that of the Agricultural Experiment Station, and that of the College of Law are all at the University in Urbana. The libraries of the Colleges of Medicine and Dentistry and the School of Pharmacy are in Chicago.

The general University library, including the Agricultural Experiment Station library, contains 105,000 volumes and pamphlets. The reading room contains over 3,100 bound volumes of periodicals. The University has a subscription list of 1,112 periodicals, the current numbers of which are kept in the east tower reading room. The library of the State Laboratory of Natural History contains 6,100 volumes and 16,440 pamphlets. The library of the College of Law contains the Federal and State Reports, the leading text-books, and a line of leading periodicals. The department of education has made a special collection of about 1,500 books and 3,000 pamphlets, which are kept in the rooms of the department in University Hall. This collection contains a very good assortment of modern text-books, and copies of the courses of study of nearly all the large city school systems.

The general library of the University is open daily, from 8 a. m. until 10 p. m. and on Sunday from 2 p. m. to 6 p. m.

The valuable library of western history collected by Edward G. Mason, Esq., long president of the Chicago Historical society, is in the Public Library of the city of Champaign, and is accessible to University students.

DITTENBERGER LIBRARY

The university has recently acquired the library of Wilhelm Dittenberger, Professor of Classical Philology in the University of Halle. This library is especially valuable for the literary study of the Classical Languages, containing, in the best editions, the works of the poets and prose-writers, both Greek and Latin, and numerous works on grammar and history of literature, with between four and five thousand dissertations and programmes on special topics. In addition there are many works dealing with the other departments of classical philology, as epigraphy, history of ancient peoples, archaeology, philosophy, history of art, geography, chronology, metric, etc.

FEES AND EXPENSES

Matriculation fee,	$10.00
Diploma fee,	5.00
Incidental fee, each semester,	12.00

Laboratory Fees and Deposits. Each student working in laboratories, or in the drafting or engineering classes, is required to make a deposit varying from 50 cents to $10.00, to pay for chemicals and apparatus used, and for any breakages or damages.

Graduate students who find it necessary to take undergraduate courses not accepted for credit must pay the proper undergraduate fee.

Table board may be obtained at prices ranging from $3.50 per week.

Room rent, with two in a room, ranges from $2.50 per week, per person.

DEPARTMENTS OF INSTRUCTION

Courses are offered in the following groups of subjects.

A. Language and Literature.
B. History and the Social Sciences.
C. Philosophy, Psychology and Education.
D. Mathematics and the Physical and Biological Sciences.
E. Engineering.
F. Agriculture.

DESCRIPTION OF COURSES

The semester and number of times per week the course is given are shown after each course thus: *I, II*; (*2*), the Roman figures indicate semesters, the Arabic, in parenthesis, indicate *hours* per week for *each semester*.

A LANGUAGES AND LITERATURES

ENGLISH

COURSES FOR GRADUATES

101. RESEARCH, as follows:

A. 13th to 14th Century, Dr. Jones.
B. 16th Century, Professor Dodge, Dr. Sherman.
C. 17th Century, Assistant Professor Baldwin.
D. 18th Century, Professor Greenough.
E. 19th Century, Associate Professor Fulton.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES.

5. SHAKSPERE AND HIS CONTEMPORARIES.—*I, II;* (*3*). Professor DODGE.

6. HISTORY OF ENGLISH CRITICISM.—*I;* (*3*). Associate Professor FULTON.

8. ELEMENTARY ANGLO-SAXON.—Professor DODGE.

10. BEOWULF AND ELENE.—*I, II;* (*3*).—Professor DODGE.

17. HISTORY OF ENGLISH LITERATURE.—Associate Professor FULTON.

19. LITERARY STUDY OF THE BIBLE.—*I, II;* (*3*). Assistant Professor BALDWIN.

25. CHAUCER, CRITICAL READING.—*I, II;* (*3*). Dr. JONES.

26. ENGLISH BALLADS AND METRICAL ROMANCES.—*I, II;* (*3*). Dr. JONES.

35. THE DRAMA.—1644-1900. *I. II;* (*3*). Mr. GUILD.

36. THE TRANSITION FROM THE SEVENTEENTH CENTURY TO THE EIGHTEENTH.—*I, II;* (*3*). Professor GREENOUGH.

37. NINETEENTH CENTURY PROSE (ADVANCED COURSE).—*I, II;* (*2*). Dr. SHERMAN.

RHETORIC

FOR GRADUATES AND ADVANCED UNDERGRADUATES

6. ENGLISH COMPOSITION.—*I;* (*3*). Professor CLARK.

17. PRINCIPLES OF CRITICISM.—The art of criticism; reports and essays. *I;* (*3*). Associate Professor FULTON.

18. Art of Criticism.—Study of selected masterpieces in English literary criticism; reports and essays. The works chosen for study will be, for the most part, from the essays of Lamb, Coleridge, De Quincey, Carlyle, Arnold, and Pater. *II; (3)*. Associate Professor Fulton.

19. History and Principles of English Versification —Theory of English metre and rhythm; history of the development of the forms of English poetry. *II; (2)*. Mr. Scott.

GERMAN

Courses for Graduates

101. The Modern Language Seminary.—The work is adapted to the abilities and tendencies of the students. The primary object is to give training in original research. The results of the work, when of value, may be published in the *Journal of English and Germanic Philology*. Professor Karsten with the cooperation of Professor Oliver, Carnahan, Lessing and Meyer.

102. Introduction to the Study of Languages.—Lectures; discussions of special topics. The psychology and physiology of human speech; principles and methods of linguistic studies. *I; (1)*. Professor Karsten.

103. Introduction to the Historical Study of the Germanic Languages.—Lectures; discussions of special topics, Survey of the early history of the Germanic peoples, classification of their languages, outline of Germanic phonetics and morphology (Urgermanisch). *II; (2)*. Professor Karsten.

104. Gothic.—An introductory study of its grammar and literature. *I; (2)*. Professor Karsten.

105. Old High German.—Grammar and interpretation of the oldest literary documents. *I; (2)*. Professor Karsten.

106. Middle High German.—Grammar and interpretation of selected texts. *II; (2)* Professor Karsten.

107. Old Saxon.—Grammar and interpretation of parts of the Heliand and the Genesis. *II; (2)* Professor Karsten.

108. Old Norse.—Grammar and interpretation of Icelandic and Norwegian texts. *II; (2)* Professor Karsten.

109. German Literature from 1786 to 1805.—The course will include Goethe's Italian journey, the period of Goethe's and Schiller's friendship, the birth of the Romantic movement.

Especial attention will be given to the influence of Goethe and Schiller upon each other as shown by their correspondence and by their works during this period. *I;* (*3*) Assistant Professor MEYER.

110. EARLY GERMAN DRAMA.—The medieval religious drama in Germany, the Shrovetide plays, the sixteenth century drama under the influence of humanism and the Reformation, with an especial study of Hans Sachs. *I, II;* (*2*) Assistant Professor BROOKS.

111. HEBBEL.—Lectures; investigations of special topics. *II;* (*2*)Mr. WIEHR.

(Attention is called here to the work in Anglo-Savon offered by the Department of English.)

113. GERMAN LITERATURE OF THE FIFTEENTH CENTURY.—After a survey of the literature on the background of the general history of the time, some such topics as Sebastian Brant the Meistersingers and the Folksong, the Prose Romances, are studied in detail. *I;* (*2*). Associate Professor LESSING.

114. GERMAN LITERATURE OF THE SIXTEENTH CENTURY.—The Reformation and its antagonists. Luther, Murner; Hans Sachs; the church hymn; the chap-books. *II;* (*2*). Associate Professor LESSING.

115. GERMAN LITERATURE OF THE NINETEENTH CENTURY.—Special attention will be given to the drama.

116. EARLY MIDDLE HIGH GERMAN LYRICS.—The sources and beginning of the Minnesong. *II;* (*2*). Dr. POOR.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES.

8. SCHILLER.—The life of Schiller and study of Wallenstein and other selections. *I;* (*3*). Associate Professor LESSING.

9. GOETHE'S FAUST.—The Faust legend and early Faust books and plays, the genesis of Goethe's Faust, reading of both parts. *I, II;* (*2*). Assistant Professor MEYER.

11. HISTORY OF MODERN GERMAN LITERATURE.—Lectures, recitations, and reports on assigned collateral reading. *II;* (*2*). Associate Professor LESSING.

26. GERMAN LITERATURE BEFORE THE REFORMATION.—Lectures, recitations, and reports on assigned reading. This course is intended to cover the period not included in course 11, and students who intend to take course 11 are advised to elect course 26. *I;* (*2*). Associate Professor LESSING.

27. LESSING.—The life of Lessing and study of Nathan der Weise, Emilia Galotti, and other selections. *II;* (*3*). Assistant Professor MEYER.

29. ADVANCED PROSE COMPOSITION.—An advanced teachers' course aiming to give some facility in idiomatic expression in speaking and writing German. Themes on Germany and German life, based on suitable reading, discussed in German. *I, II;* (*2*). Professor KARSTEN, Mr. WIEHR.

ROMANCE LANGUAGES

COURSES FOR GRADUATES

102. OLD FRENCH READINGS.—Readings from the earlier monuments of medieval French literature, including the Song of Roland and the works of Christian of Troyes. Study of the medieval literary history of France. *I, II;* (*2*), Professor OLIVER.

103. OLD FRENCH PHONOLOGY AND MORPHOLOGY.—A study of the phonetic laws underlying the development of Old French from Low Latin. *I, II;* (*2*). Associate Professor CARNAHAN.

104. OLD SPANISH.—Reading of the older monuments of Spanish literature. Phonetics and syntax. *I, II;* (*2*). Dr. SEYMOUR.

105. OLD ITALIAN READINGS AND HISTORICAL GRAMMAR OF ITALIAN.— *I, II;* (*2*). Dr. JONES.

106. SEMINARY IN ROMANCE LANGUAGES.—Research work in subjects assigned as theses. Professor OLIVER, Associate Professor CARNAHAN, Dr. JONES, and Dr. SEYMOUR.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

3. ADVANCED PROSE COMPOSITION AND CONVERSATION.—This course may be taken alone or, more profitably, with any of the following courses. It is especially designed for students in the courses in business training and for those intending to teach French. *I, II;* (*2*). Associate Professor CARNAHAN.

10. MODERN FRENCH DRAMA.—A study of the drama in France from the beginning of the nineteenth century to the present time. Rapid translation and sight reading. Lectures. Reports on collateral reading. *I, II;* (*2*). Associate Professor CARNAHAN.

11. Victor Hugo and the Lyric Poets of France.—Rise and growth of lyric poetry in France. The chief emphasis falls upon Victor Hugo, although the poets previous to Hugo and also his contemporaries receive attention. The principles of French versification are studied and illustrated particularly in examples of Victor Hugo's poems. *I, II;* (*2*). Dr. Jones.

12. Modern French Novelists.—A study of the novel in French from the beginning of the nineteenth century to the present time. Rapid translation and sight reading. Hugo, deVigny, Dumas, Balzac, Flaubert, Daudet, Zola, and living writers. Lectures. Reports on collateral reading. *I, II;* (*2*). Associate Professor Carnahan.

14. Classic French Drama.—A history of French drama from the beginning of the seventeenth to the end of the eighteenth century. The emphasis will fall on Corneille, Racine, Moliere in the seventeenth century; and on Marivaux, Voltaire, Beaumarchais, LeSage and Sedaine in the eighteenth century. *I, II;* (*3*). Professor Oliver.

Spanish

2. Conversation and Composition.—Reading of modern prose, conversation and composition. The vocabulary of everyday life is emphasized. Commercial correspondence. *I, II;* (*2*). Mr. Seymour.

3. Literary Course.—Advanced reading and composition. The modern novel, drama and poetry will be studied. Readings from Cervantes, Don Quixote. Outline of Spanish literature. *I, II;* (*3*). Mr. Seymour.

GREEK

Course for Graduates

101. Greek Oratory.—Professor Moss.

Courses for Graduates and Advanced Undergraduates

10. Greek Tragedy.—*I;* (*2*). Professor Moss.

12. Thucydides.—*II;* (*2*). Professor Moss.

14. Advanced Greek Prose Composition.—*I;* (*1*). Professor Moss.

LATIN

Courses for graduates and advanced undergraduates

7. Prose of the Early and the Late Empire.—Selections from Petronius, Pliny the Elder, Apuleius, and Minucius Felix. The Roman novel. *II;* (*2*). Dr. Allen.

8. Roman Satire and Epigram.—Selections from Juvenal and Martial. History of Roman Satire. *II; (3)*. Dr. Allen

11. The Elegiac Poets.—Tibullus, Propertius, and Ovid *II; (3)*. Dr. Allen.

14. Seneca.—Two or three plays; Roman tragedy; selections from the Epistles; Seneca as a teacher of morals. *I; (3)*. Professor Barton.

15. Poetry of the Early and the Late Empire.—Selections from Lucanus, Calpurnius, Ausonius, and Cludianus. *I; (2)*. Professor Barton.

16. Vergil.—Selections from the Aeneid, books 7-12, the Eclogues and portions of the Georgics. *II; (3)*. Dr. Allen.

17. Tacitus.—Germania, and Agricola. *II; (3)*. Dr. Allen.

B. History and the Social Sciences

HISTORY

Courses for Graduates

101. Seminary in American History.—*I, II; (2)* Professor Greene, Assistant Professor Alvord.

102. Seminary in English History.—This course is adapted to students who wish to write theses in English history. *I, II; (2)* Dr Larson.

103. Historical Bibliography and Criticism.—This course is designed to familiarize the student with historical bibliography and method. Selected problems in various fields will be worked out under the guidance of the several instructors. Required of all candidates for an advanced degree in history who do not present evidence of similar training elsewhere. *I, II; (2)*. Professor Greene, Professor Ford, Assistant Professor Alvord.

104. Seminary in Modern European History.—In 1907-08 the work will be on the regeneration of Prussia between 1807 and 1813. *I, II; (2)* Professor Ford.

Courses for Graduates and Advanced Undergraduates

(The ability to use French and German is desirable in all of these courses and is essential in some of them.)

4. English Constitutional History.—Special emphasis is laid on the formative period. This course is recommended

for students who wish to specialize in English history, in political science, or in law. *I, II;* (*3*). Dr. LARSON.

5. THE HISTORY OF GREECE.—*I, II;* (*3*). Assistant Professor ALVORD.

6. THE HISTORY OF ROME.—*I, II;* (*3*). Assistant Professor ALVORD.

Courses 5 and 6 will ordinarily be given in alternate years.

THE REVOLUTIONARY AND NAPOLEONIC ERA.—This course will include a survey of French conditions in the eighteenth century before 1774, an account of the events between 1774 and 1789 which precipitated the Revolution in France, the reform work of the early years of the Revolution, and the rise and dominance of Napoleon in France and Europe. Text books, readings and lectures. *I;* (*4*). Professor FORD.

8. CULTURE IN THE MIDDLE AGES.—The main object of this course is to present the intellectual side of medieval civilization. The broad outlines of social and economic development will serve as a background. *I;* (*3*). Dr. PAETOW.

Students of history should also note the description of Philosophy 10 (Thought Movements of the Nineteenth Century).

9. THE PERIOD OF THE ITALIAN RENAISSANCE.—*II;* (*3*). Dr. PAETOW.

12. THE HISTORY OF GERMANY.—Special attention is given to the rise of Prussia and the establishment of the new German Empire. *I, II;* (*3*). Professor FORD.

13. AMERICAN HISTORY.—1760–1789.—The Colonies in 1760 the American Revolution, and the formation of the state and federal constitutions. *I;* (*3*). Professor GREENE.

15. THE CONSTITUTIONAL AND POLITICAL HISTORY OF THE UNITED STATES SINCE 1860.—*II;* (*3*). Professor GREENE.

17. THE HISTORY OF ILLINOIS.—The subject is treated not from a purely local point of view, but as illustrating the development of a typical commonwealth in the Middle West. *I;* (*2*). Professor GREENE, Assistant Professor ALVORD.

19. PRUSSIA DURING THE ERA OF REFORM AND THE WARS OF LIBERATION.—1807–1815.—This course involves a close study of a limited field of Prussian history. *I, II;* (*2*). Professor FORD.

20. EUROPE IN THE NINETEENTH CENTURY.—An account of the national movements of the nineteenth century and of those European political conditions which lie at the basis of

modern world politics. Text books, lectures and readings. *II;* (*4*). Professor FORD.

21. THE REFORM LEGISLATION IN FRANCE.—1789–1793.—A study of those measures which constitute the true Revolution of France. *I, II;* (*2*). Professor FORD.

22. AMERICAN HISTORY.—1820–1860.—An intensive study of the period, including social as well as political history. *II;* (*3*). Professor GREENE.

ECONOMICS

No student may enter upon graduate work in economics unless he has had a thorough course in the principles, representing such amount of work as would ordinarily be done in a five hour course through one semester, and has also taken a course in some special part of the field of economics, such as public finance or money and banking. In other words, substantially a year's work of undergraduate character is required.

The department of economics includes general economics, economic history, finance, commerce and industry.

The library equipment of the department is one of the best in the country. Complete sets of all the important French, German, English and American economic and financial journals are on hand and 85 periodicals, foreign and domestic, in economics, finance, commerce, industry, statistics, etc., are currently received.

COURSES FOR GRADUATES

101. RECENT ECONOMIC THEORY.—Two hours. Professor KINLEY.

103. SEMINARY IN RAILWAY ADMINSTRATION.—Two hours. Professor DEWSNUP.

104. SEMINARY IN COMMERCE.—Two hours. Professor FISK.

106. TAXATION.—A study of the theory and history of taxation and of special problems in taxation in the United States. two hours. Assistant Professor WESTON.

107. THE CORPORATION IN ECONOMIC EVOLUTION.—*II, III.* Two hours. Professor ROBINSON.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

4. FINANCIAL HISTORY OF THE UNITED STATES.—A study of colonial and federal finance, including currency, banking,

tariff and fiscal questions and a brief survey of the development of the financial systems of some of the leading states, as New York and Illinois. *I; (3)*. Assistant Professor WESTON.

5. PUBLIC FINANCE.—A study of public expenditures, financial administration, taxation and public debts. *II; (3)*. Assistant Professor WESTON.

8. THE MONEY MARKET.—An advanced course dealing with rates of exchange, functions of bill broker and banker, causes of fluctuations in rates of discount, the concentration of financial dealings at such centers as New York and London, international payments and the determination of rates of foreign exchange, the effect of different monetary standards on international payments, monetary panics and crises, and the financial aspects of dealing on the stock and produce exchanges. *II; (2)*. Assistant Professor WESTON.

9. BANKING.—This is a course in the study of practical banking with special reference to the United States, England, Germany, France and the Orient. *I; (2)*. Assistant Professor WESTON.

10. CORPORATION MANAGEMENT AND FINANCE.—The growth of corporations; their causes and forms; the promotion, financiering, incorporation, and capitalization of corporate consolidations; their organization and securities, position and relations of stockholders and directors, analysis of reports, stock speculation, relations of industrial corporations to international competition, receiverships and reorganizations, social and political effects. *I; (3)*. Professor ROBINSON.

11. INDUSTRIAL CONSOLIDATIONS.—The development of industrial consolidations; the growth of monopoly; monopoly prices and methods; the ability of trusts to affect prices, wages, interest and profits; and the proposed plans for controlling trusts. *II; (3)*. Professor ROBINSON.

12. THE LABOR PROBLEM.—The labor movement and its social significance. The progress of the laboring classes, the legal relations of employer and employed, wages, strikes, arbitration, labor organizations, and similar topics are studied. *I; (3)*. Professor KINLEY.

18. ECONOMIC SEMINARY.—*I, II; (4-8 for the year)*. Professor KINLEY and other members of the department.

20. History and Literature of Economics.—The purpose of this course is to trace the development of economic thought. Emphasis is placed upon the relation of economics to philosophical and political theories, as well as to political and industrial conditions. *I, II; (2)*. Dr. Thompson.

21. Socialism and Social Reform.—*II; (3)*. Dr. Thompson.

24. Theory of Statistics. Given as Mathematics 29.

29. Foreign Commerce and Commercial Politics.—A study of the various commercial systems (mercantile, free trade and protective): classes and administration of customs tariffs; commercial treaties, including premiums, reciprocity and most favored nation relations; how foreign purchases and sales are effected; commercial statistics and balances; institutions for furthering export trade (commercial museums and bureaus of information, sample houses, consular reports, etc). *II;* (3). Professor Fisk.

31. History of the Commercial Relations of the United States.—This comprises a study of the general trade relations of the United States with foreign countries as well as a more detailed consideration of our commercial relations with certain countries. It is desirable, though not required, that this course be taken in connection with 35. *I, II; (2)*. Professor Fisk.

32. Domestic and Foreign Markets of the United States.— *I, II; (2)*. Professor Fisk.

33. Economics of Insurance.—The historical development of insurance, and an extended discussion of its economic aspects. *I; (2)*. Professor Robinson.

35. Consular and Diplomatic Service.—The basis of this course is the consular and diplomatic relations of the United States. Some attention, however, is paid to the foreign service of other important countries. *I, II; (1)*. Professor Fisk.

41. Railway Organization and History.—A study of the details of railway organization, with reference to varying types, combined into a survey of the growth of the railways of the United States. Under this latter head some account of the history of pooling, of the movements towards railway consolidation and unity of control, and of the present organization and attitude of railway labor will be given. Professor Dewsnup.

42. Railway Administration.—This course deals with (1) railway finance and taxation (2) theory of rates, and (3) state administration in the United States and abroad. *I*; (3). Professor Dewsnup.

43. Traffic Administration. The work of the freight and passenger traffic departments is treated with reference to general problems, classification of business, stimulation of business by advertising and other means, necessary forms and reports, special traffic claims, classifications and traffic, interrelation of railways in traffic matters. *I;* (3). Professor Dewsnup.

44. Railway Transportation.—The train service, train dispatching and the block system of train working will be emphasized. In connection with this the subject of train speed and train accidents will be given some attention. The handling of the passenger service and some study of passenger terminal facilities is included in the course. *II;* (*2*). Professor Dewsnup.

45. Railway Practice.—A careful study of the design of steam tracks, freight houses, and yards, with reference to economy and expedition of operation; methods of operation; fast freight services; car service and demurrage arrangements. A considerable portion of the course is assigned to the economics of railway location and operation. *I;* (*2*). Professor Dewsnup.

47. Foreign Railway Systems.—A general study of some one foreign railway system, varying from time to time. (1908-9. The English Railway System). The organization, methods of operations, and political and other relations of the system will be detailed. *II;* (*2*). Professor Dewsnup.

SOCIOLOGY

The undergraduate preparation for graduate work in sociology may be in economics and history or in economics and psychology. But in such cases students whose major is sociology may not omit courses 1, 2, 3, and 4.

Courses for Graduates

101. Sociological Method.—A study of the method of advancing the science of sociology, especially a discussion of the adaptability to sociological investigation of the methods described in certain great works on methodology, for example, Pearson's Grammar of Science, Wundt's Methodenlehre, erster und

vierter Abschnitt, Seignobos' La Methode Historique Appliquée aux Sciences Sociales. *I; (3)*.—Professor HAYES.

102. THE DEVELOPMENT OF SOCIOLOGY.—A reading course in the original works of the writers who have contributed most to the development of sociology, accompanied by discussions with the instructor. *I, II; (3)*. Professor HAYES.

150. SEMINARY.—The subjects pursued in Seminary vary from year to year. It is probable that the next year's work will be devoted to specific problems in population and statistics, including immigration, public health, and the relations of these to poverty, vice and crime. *I, II;* one session of two hours each week.—Professor HAYES.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

1. GENERAL SOCIOLOGY.—An attempt to develop clearly the fundamental concepts of sociology, to summarize certain of its main teachings and to render familiar its distinctive points of view in the study of human affairs. *I; (3)*. Professor HAYES.

2. SOCIAL CONTROL AND SOCIOLOGICAL ETHICS.—An explanation of the methods by which society controls the conduct, beliefs and desires of its members, by law, religion, education, public opinion, and other and subtler agencies; together with a study of the rational motives of conduct revealed by analysis of the facts of social life. *II; (3)*.—Professor HAYES.

3. COMPARATIVE AND GENETIC SOCIOLOGY.—A description and comparison of different modes of human activity, (economic, political, legal, ethical, religious, domestic, and those pertaining to knowledge, art, amusement, etc.,) which prevail among savage, barbarous and civilized peoples; together with a theory of social development, illustrated by the facts described and affording both an hypothesis for their explanation and a theory of the method of the progress. *I; (3)*. Professor HAYES.

4. PSYCHOLOGICAL SOCIOLOGY.—In this course psychological data are employed in explaining social facts. Attention is largely devoted to the way in which particular social activities are conditioned by the other activities in the presence of which they are carried on. The treatment includes such subjects as the movements of minds in groups and masses, custom, fashion, conventionality, leadership, innovation, mobs, public sentiment and public opinion. *II; (3)*. Professor HAYES.

5. Charities and Corrections.—The prevention and treatment of pauperism and crime; and, in general, practical methods of diminishing the prevalence of undesired social activities, and of increasing the prevalence of desired activities. *II; (3)*. Professor Hayes.

The attention of students in this department is especially directed to the following courses.

Economics 12: The Labor Problem.

Economics 21: Socialism and Social Reform.

History 8: Culture in the Middle Ages.

History 22: An intensive study of American history for the period 1820–1860.

Philosophy 5: Political Philosophy.

Philosophy 9: Political and Social Ethics.

Political Science 2: European Governments.

Political Science 4: Municipal Government.

Political Science 5: International law.

POLITICAL SCIENCE

Courses For Graduates and Advanced Undergraduates

2. European Governments.—A comparative study of the national political systems of Great Britain, France, Germany, Italy, and Switzerland, with special reference to constitutional beginnings, political organization, methods of legislation and administration, and constitutional guarantees for the protection of individual rights. Open to juniors, seniors and graduate students who have had course 1, or its equivalent. *II; (3)*. Professor Garner.

4. Municipal Government.—A study of the organization and administration of city government in the United States and in Europe. Emphasis is given to the causes which have led to the phenomenal growth of cities; the powers and liabilities of municipal corporations; and the problems of governing the modern municipality, particularly those relating to urban transportation, police, light and water supply, charities, education, municipal ownership of public utilities, etc. Lectures, assigned readings and reports. *I; (2)*. Professor Garner.

5. Federal Administration.—A survey of federal administrative activites. The organization and work of the nine excutive departments and of the various commissions and agencies

of the national government; the administrative law governing official relations. *II;* (*2*). Professor GARNER.

6. INTERNATIONAL LAW.—The development of the law of nations; its nature, source and present status; the equality of states; the doctrine of intervention; the law of war and peace; the rights and duties of neutrals; the arbitration movement. Lectures, recitations, assigned readings and reports. Open to juniors and seniors. Others who are qualified may be admitted by special permission. *I;* (*3*). Professor GARNER.

7. AMERICAN DIPLOMACY.—A study of the genesis and present organization of the Department of State; the diplomatic service; the treaty making power; the methods and traditional principles of the foreign policy of the United States; historical review of the principal diplomatic controversies between the United States and foreign powers from the foundation of the government to the present time; the elevation of the United States to the position of a world power. *II;* (*3*). Professor GARNER.

C PHILOSOPHY PSYCHOLOGY AND EDUCATION

PHILOSOPHY

COURSES FOR GRADUATES

101. THE PHILOSOPHY OF PLATO AND ARISTOTLE.—Several dialogues of Plato, and the Organon, Metaphysics, Ethics, Rhetoric, Poetics and parts of the DeAnima of Aristotle, are read in translation. *I, II;* (*2*). Professor DANIELS.

102. CONTEMPORARY PHILOSOPHY.—An historical and critical survey of the field of philosophy at the present time, involving a brief review of the philosophical situation at the time of Kant. *II;* (*2*). Assistant Professor TAWNEY.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

3. ANCIENT AND MEDIÆVAL PHILOSOPHY.—A rapid survey of the development of speculative thought, beginning with the early Greek philosophers and continuing through the Mediæval period. *I;* (*3*). Professor DANIELS.

4. MODERN PHILOSOPHY.—The formation and development of the problems and conceptions in philosophy from Descartes to the present time. Selections from the philosophical masterpieces of this period. *II;* (*3*). Professor DANIELS.

5. Political Philosophy.—Philosophical theories of the state, historical, critical and constructive. The nature of the state, fundamental political principles, natural law and natural right. *II; (2)*. Assistant Professor Tawney.

6. Ethical Ideals.—An historical study of philosophical thought in ancient, mediæval and modern times with reference to the problem of conduct. This course will include, as an introduction, some study of the beginnings of reflective thought on ethical questions in the race and the individual. *II; (3)*. Professor Daniels.

8. Esthetics.—Theory of appreciation of art and nature; place of such appreciation in life. (a) Primitive art and appreciation. (b) Modifications of the esthetic (such as the sublime and the ugly). (c) Primitive characteristics and relations of the various fine arts. *I; (3)*. Dr. Norton.

9. Political and Social Ethics.—A study of ethical principles in their application to political and social relations. *I; (2)*. Professor Daniels.

11. Philosopy of Religion.—The philosophical interpretation of religious consciousness, with reference to the value of a rational view of religious ideas.—Open to senior and graduate students only. *I, II; (2)*. Professor Daniels.

12. Types of Epistemology and Metaphysics.—An historical, critical, and constructive course of lectures and discussions. Readings from recent representatives of idealism, agnosticism, realism and pragmatism. The second semester will be devoted chiefly to systematic constructive work. *I, II; (3)*. Assistant Professor Tawney.

13. Philosophy of Nature.—Relations between science and philosophy. Historical sketch of the foundations of our modern conception of nature. Metaphysical value of these. The relation of evolution to causation, of mind to body and of realism to idealism in science. *II; (3)*.

14. The Principles of Knowledge and the Method of Scientific Investigation.—An advanced course in real logic beginning with a thorough review of the principles of formal logic begun in course 1, and the chief methodological presuppositions of the mathematical, the physical, the biological, the psychological and the philosophical sciences. *II; (3)*. Assistant Professor Tawney.

15. The Philosophical Thought of England in the Eighteenth Century.—With special reference to Hobbes, Locke, Berkeley and Hume. This is in many ways the most significant period in English philosophy its influence on the thought of the present day being everywhere felt and evident. The course is a study of philosophical and scientific empiricism as represented in the works of these men. It will necessarily begin with a statement of the situation in philosophy at the opening of the eighteenth century and comprise readings, discussions and lectures. *I;* (*3*). Assistant Professor Tawney.

PSYCHOLOGY

Courses for Graduates

101. Original Research.—Opportunity to investigate advanced problems in experimental psychology, and in comparative and genetic psychology is offered to those properly qualified. *I, II.* Professor Colvin, Assistant Professor Baird.

103. Seminary in Philosophy and Psychology.—*I, II;* (*1*). Professor Daniels, Professor Colvin.

Courses for Graduates and Advanced Undergraduates

10. The History of Psychology. *II;* (*2*). Professor Colvin.

11. Problems in Experimental Psychology.—A lecture course primarily for seniors and graduates. The most prominent investigations of recent years will be given a critical discussion; their results will be evaluated and interpreted. The following topics will be considered: sensation, affection, attention, perception, emotion, memory, imagination, mental types, rhythm, judgment, the learning process. *II;* (*2*). Assistant Professor Baird.

12. Minor Problems in Experimental Psychology.—This is an advanced laboratory course in which special investigation work is undertaken by the students. *I, II;* (*2-5*). Assistant Professor Baird.

EDUCATION

No student may do major work for an advanced degree in the department who has not had the following courses or their equivalents:—

1. Principles of Education; 2. History of Education; 3. General Method.

An introductory course in psychology and one in philosophy are also required, and an elementary course in sociology is strongly advised.

COURSES FOR GRADUATES

101 a. SEMINARY IN EDUCATION AND PSYCHOLOGY. *I, II*; (*2*). Professor COLVIN.

104 a. SEMINARY IN THE COURSE OF STUDY. *I*. (*Arrange number of credits*). Dr. NORTON.

104 b. SEMINARY IN MORAL AND RELIGIOUS EDUCATION *II*; Dr. NORTON.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

13. EDUCATIONAL CLASSICS.—A critical study of the sources of the history of education. The more important educational works of Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, Pestalozzi, Herbart, Froebel, Spencer, and others are considered. *I*; (*3*). Dr. NORTON.

16. SOCIAL PHASES OF EDUCATION.—A consideration of the school as a social factor, its relation to the home, the church, the state, and society. The relation of education to vocation and crime are also considered. *II*; (*3*). Dr. NORTON.

17. HERBARTIAN PEDAGOGICS.—The philosophy, psychology, and pedagogy of Herbart are critically studied and compared with other pedagogical systems. *I*; (*2*). Dr. NORTON.

18. PRINCIPLES OF ESTHETIC EDUCATION.—The values, ideals, and methods of esthetic education; its relation to intellectual (especially scientific) training, to moral and religious culture, and to the utilities of life; its effect on social and national life and on the general advancement of the fine arts; selection of the material of instruction, and the development of taste. Somewhat extended reference will be made to musical education. *II*; (*3*). Dr. NORTON.

D MATHEMATICS AND THE PHYSICAL AND BIOLOGICAL SCIENCES

MATHEMATICS

COURSES FOR GRADUATES

12. THEORY OF INVARIANTS.—The general development of the theory of invariants, both from the geometric and from the

algebraic side. Applications of invariants to systems of conics and higher plane curves. *I; (3)*. Assistant Professor RIETZ.

13a. FUNCTIONS OF REAL VARIABLES.—The two courses in functions (13a, 13b) are a continuation of the work done in calculus (8a, 8b, or 7, 9). Under functions of real variables, considerable attention is given to the fundamental ideas of the analysis, including rational and irrational numbers. mengelehre, single and double limits and their application to questions of continuity of functions of one or two variables, uniform, convergence of series, etc. The existence of derivatives, condensation of singularities, definite integrals, differentiation and integration of series are also discussed. *I, II; (3)*. Professor TOWNSEND.

13b. FUNCTIONS OF A COMPLEX VARIABLE.—A general introduction to the theory of functions of a complex variable. The methods of Weierstrass and Riemann are followed. *I, II; (3)*. Professor TOWNSEND.

14. METHOD OF LEAST SQUARES.—The fundamental principles of the subject. The following subjects are studied: Law of probability and error, adjustment of observations, precision of observations, independent and conditional observations, etc. *I; (2)*. Assistant Professor STEBBINS.

15. SEMINARY AND THESIS.—*I, II; (3)*. Professor TOWNSEND, Professor MILLER, Assistant Professor RIETZ, Assistant Professor HASKINS.

18. HIGHER PLANE CURVES.—This course includes the general theory of algebraic curves, together with the application of the theory of invariants to higher plane curves. Special study is made of curves of the third and fourth order. *II; (3)* Dr. SISAM.

20. CALCULUS OF VARIATIONS.—This course has for its aim merely to acquaint the student with those elements of the science which are most needed in the study of the higher subjects of mathematical astronomy and physics. *II; (3)*. Professor SHATTUCK.

21. SPHERICAL HARMONICS.—This course is introduced by a short course of lectures and study of certain trigonometric series. Fourier's Theorem for developing any function of a variable in a series proceeding in sines and cosines of multiples of the variable is derived and the limitations of its validity inves-

tigated. This is followed by the study of Lagrange's, Laplace's, and Lamé's functions and their applications to astronomical and physical problems. *I; (3)*. Assistant Professor HASKINS.

22. POTENTIAL FUNCTION.—The potential function is defined and its properties derived and discussed. The potential of various bodies, such as of wire, a spherical shell, a sphere, ellipsoid of revolution, etc., is computed. Poisson's and Laplace's Equations are derived and discussed. Green's propositions with kindred and similar subjects are considered. *II; (3)*. Assistant Professor HASKINS.

23. MODERN GEOMETRY.—This course includes, in general, a consideration of homogeneous coördinates, duality, descriptive and metrical properties of curves, anharmonic ratios, homography, involution, projection, theory of correspondence, etc. *I; (3)*. Dr. SISAM.

24. ALGEBRAIC SURFACES.—In this course are considered the application of homogeneous coördinates and the theory of invariants to geometry of three dimensions, and also the general theory of surfaces, together with the special properties of surfaces of the third and fourth order. *II; (3)*. Dr. SISAM.

25. PARTIAL DIFFERENTIAL EQUATIONS.—It deals with the integration and determination of the integration constants of such partial differential equations as arise in the study of such subjects as the flow of heat, the vibration of strings, plates, etc., and electricity. *II; (2)*. Professor TOWNSEND, Assistant Professor RIETZ.

27. ELEMENTARY THEORY OF GROUPS.—The study of the groups which present themselves in arithmetic, geometry and trigonometry is followed by a determination and study of those which can be represented with a small number of letters. The latter part of the course is devoted to the abstract group theory and the Galois theory of equations. *I, II; (3)*. Professor MILLER.

28. THEORY OF NUMBERS.—The principal subjects considered in this course are: congruences, Kronecker's modular systems, quadratic residues, quadratic forms, and algebraic numbers. *I, II*; *(3)*. Professor MILLER.

30. THEORY OF STATISTICS.—The general methods of statistical investigation, the application of the theory of probability to statistical data, the fitting of the curves of observation, in-

terpolation, theory of errors, and the mathematical theory of variability and correlation, the application of principles developed to problems in economics and biology. *I;* (*3*). Assistant Professor RIETZ.

31. ACTUARIAL THEORY.—A detailed study of the application of probability to life contingencies, the construction and graduation of mortality tables, the elements of fire insurance, and the calculation of premiums for various types of life and fire insurance. *I;* (*3*). Assistant Professor RIETZ.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

In addition to the above courses mathematics 8b, 10, 11, 16, 17 and 29 may be taken as a first minor by those who are taking their doctorate in another department. From students majoring in other than applied mathematics, mathematics 8a, (or 7 and 9) will be accepted as a second minor in addition to the above subjects. From students majoring in applied mathematics only those subjects indicated above for the first minor would be accepted as second minor.

7. DIFFERENTIAL CALCULUS.—The principles of the differential calculus are developed and applied to functions of one and of several variables, with special reference to the needs of engineering students. *I;* (5). Professor MILLER, Assistant Professor RIETZ, Assistant Professor HASKINS Mr. PONZER.

8a. DIFFERENTIAL AND INTEGRAL CALCULUS.—A general introduction to the principles of differential and integral calculus. *I;* (*5*). Professor TOWNSEND, Dr. SISAM.

8b. DIFFERENTIAL AND INTEGRAL CALCULUS (Advanced Course).—A continuation of 8a. The application of calculus to geometry and mechanics, begun in 8a, is extended throughout the course. *I, II;* (*2*). Professor TOWNSEND, Dr. SISAM.

9. INTEGRAL CALCULUS.—This course together with mathematics 7 constitutes a year's continuous work in calculus. The general principles of the integral calculus are developed with usual applications to geometry, centers of gravity, moments of inertia, etc. A brief introduction to ordinary differential equations is also included. *II;* (3). Professor MILLER, Assistant Professor RIETZ, Assistant Professor HASKINS, Mr. PONZER.

10. THEORY OF EQUATIONS.—A continuation of the theory of equations given in college algebra (Mathematics 1, 2). It is based on *Burnside and Panton's Theory of Equations, Part one. II; (3)*. Professor TOWNSEND, Dr. NEIKIRK.

11. THEORY OF DETERMINANTS.—The general principles and properties of determinants, including determinants of special form and the functional determinants—Jacobians, Hessians. Wronskians. The application of determinants to the theory of equations, analytical geometry including linear transformation. *II; (2)*. Associate Professor MILLER.

16. DIFFERENTIAL EQUATIONS.—For students in the courses of engineering and of mathematics and of astronomy. It embraces the following topics: General linear equations with constant coefficients, special forms of differential equations of higher order, integration in series, etc. *I; (3)*. Professor SHATTUCK.

17. SOLID ANALYTICAL GEOMETRY.—A general review of the position of the plane and the right line in space and the more general properties of surfaces of the second degree. The classification and special properties of quadratics, and a brief introduction to the theory of surfaces in general. *II; (3)*. Assistant Professor HASKINS.

29. AVERAGES AND THE MATHEMATICS OF INVESTMENT.—The meaning, use, and abuse of different kinds of averages. The relation of the theory of probability to averages, and the application of the elements of probability to annuities, insurance, and various branches of science. Such information relating to loans and investments as can best be put into algebraic language, and are of interest to the general student. Many practical problems are given in the valuation of investment securities. *II; (3)*. Assistant Professor RIETZ.

ASTRONOMY

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

7. THEORETICAL ASTRONOMY.—This course begins with the elementary theory of the motions of the heavenly bodies, and is intended to lead the student up to the actual computation of a cometary orbit. *I, II; (3)*. Assistant Professor STEBBINS.

9. CELESTIAL MECHANICS.—A continuation of course 7. Introduction to the theory of disturbed planetary motion. *I, II;* Assistant Professor STEBBINS.

10. Seminary and Thesis.—*I, II; (3).* Assistant Professor Stebbins.

14. Observational Astronomy.—This course is intended for those who wish to become familiar with the working methods of an astronomical observatory. The problems set for solution are largely individual. *II; (3).* Assistant Professor Stebbins.

15. Geodetic Astronomy.—A course in continuation of astronomy 3, 6, for those who wish to go into geodetic work. Advanced work with the sextant, transit, and zenith telescope. The methods taught are similar to those of the United States Coast Survey. *I; (3).* Assistant Professor Stebbins.

BOTANY

COURSES FOR GRADUATES

After at least one year of biological work graduates may elect any of the courses 3, 5, 7, 9, 16, or 17 for minor credit, and of courses 3, 7, 9 and 16, with assigned additions for major credit towards an advanced degree. The following are open only to graduates of liberal botanical training.

In every case we should expect that the student would have at least one year of botanical work, somewhat equivalent to courses 1 and 2, before he can enter upon a course leading to major credit towards an advanced degree, and of course he must be otherwise prepared to pursue profitably any subject that may be chosen.

101. Biological Botany.—The preparation and study of material by histological and embryological methods, and experiment work with living vegetation in the laboratory and field in working out special problems in the development, physiology, and pathology of plants.

102. Systematic Botany.—Critical aud comparative studies of species included in chosen groups of spermaphytes or sporophytes, of from selected geographic areas, in connection with considerations of genealogic development, geographic distribution, and interrelated association.

103. Bacteriology.—Investigations upon morphologic and physiologic variation due to treatment; systematic studies upon the number, validity, and relationship of species, researches up-

on special saprophytic or parastic kinds of bacteria and upon methods of favoring or combating their activities.

For Graduates and Advanced Undergraduates

3. Cytology and Physiology.—Lectures, laboratory work and assigned reading. The course extends through the year, but the work of each semester is credited separately under the designations of 3a and 3b. The first semester is devoted mainly to cytology and histology, with special attention to technique: during the second semester experimental physiology receives chief attention. *I, II; (5)*. Assistant Professor Hottes.

5. Bacteriology.—An introduction to the knowledge of the subject and instruction in methods. *II; (5)*. Professor Burrill, Mr. Briscoe.

7. Plant Pathology.—Diseases and injuries of plants. Mostly laboratory, herbarium and field work, and assigned reading. *I; (3)*. Professor Burrill.

9. Investigation and Thesis.—Research work upon selected subjects. Special arrangements for this work should be made during the preceding year. *I, II; (5)*. Professor Burrill, Assistant Professor Hottes.

16. Taxonomy of Special Groups.—Mostly laboratory and herbarium work, and assigned reading. The course extends through the year, but the work of each semester is credited separately under the designations of 16a and 16b. *I, II; (5)*. Professor Burrill, Dr. Gleason.

HOUSEHOLD SCIENCE

Courses for Graduates

101. Home Economics.—A study of the origin and development of home economics, with particular reference to its industrial, educational, and sociological aspects. Professor Bevier.

102. Special Investigations.—Problems in the application of the principles of bacteriology, chemistry, and physiology, to the ordinary processes used in the preparation of food. Professor Bevier.

Courses For Graduates And Advanced Undergraduates

4. Food and Nutrition.—An application of the principles of pure science to the problems of food and nutrition. The

problems may be physiological, chemical or bacteriological. *I;* (*5*). Professor BEVIER, Assistant Professor USHER.

5. DIETETICS.—The work in dietetics includes the following topics: The principles of diet, the relation of food to health; influence of age, sex and occupation on diet, the construction of dietaries; dietetic treatment of certain diseases; principles of home nursing. Laboratory practice is given in the course. *II;* (*3*). Assistant Professor USHER.

9. SEMINARY.—A study of different phases of home economics and individual problems in some one of these phases. *II;* (*2*).

PHYSICS

COURSES FOR GRADUATES

The prerequisite for graduate work in physics is a University or college course in general physics with a year's laboratory course in introductory physical measurements. The student who is to do major work in physics should also have had additional courses in physics or teaching experience, unless the training in his minor subjects, mathematics or chemistry, has been strong and complete. The courses named below are those open for candidates for the Master's and Doctor's Degrees. A large part of the last year's work of the candidate for the Doctor's Degree is investigational, along either the experimental or the theoretical side of physics. In addition to the following major course for graduates, the "intermediate" courses on properties of matter sound, heat, light, and electricity and magnetism (see University catalog Courses 14, 15, 16, 17, and 23) may be offered by students making a minor in physics.

104a. INTRODUCTION TO THEORETICAL ELECTRICITY.—A course of lectures and recitations discussing the phenomena with elementary calculus methods, and with occasional lecture-room demonstrations. Two periods weekly for the year. Assistant Professor KNIPP.

104b. ELECTRICAL AND MAGNETIC MEASUREMENTS.—Laboatory exercises with discussions and recitations, giving a systematic course in exact electrical and magnetic measurements. Two three-hour periods weekly for the year. Assistant Professor KNIPP and Mr. WILLIAMS.

120a. LIGHT.—Lectures and recitations with class demon strations of special phenomena discussed in the text. Wood's

Light is used as a text and reference book. Three periods weekly for one semester. Assistant Professor ———.

120b. LIGHT.—A laboratory course in light measurements selection experiments in dispersion, refraction, interference, polarization, etc. Two to five periods weekly for either semester. Assistant Professor ———.

121. RECENT ADVANCES IN PHYSICAL SCIENCE.—Lectures illustrated by experiments on the more recent developments of physics. The subject for the first semester of 1908–09, will be Electrical Waves and Resonance, to be given by Dr. KNIPP. The subject for the second semester will be announced later. One lecture weekly for the year. Professor CARMAN, Assistant Professors KNIPP, WATSON and ———.

122. THERMODYNAMICS.—Lectures and collateral reading on the principles and methods of thermodynamics. This course includes a discussion of thermometry, calorimetry the laws of the conservation and transformation of energy, and the application of these laws to typical physical and chemical phenomena. Bryan's Thermodynamics is used as a text and reference book. Two periods weekly second semester. Associate Professor GOODENOUGH.

124. CONDUCTION OF ELECTRICITY IN GASES AND RADIO-ACTIVITY.—A critical study both theoretical and experimental of recent investigations in this line. Text-books: THOMSON'S Discharge of Flectricity through Gases, and RUTHERFORD'S Radio-Activity. Three periods weekly. (Not given in 1907–08.) Assistant Professor KNIPP.

130a. MATHEMATICAL THEORY OF ELECTRICITY AND MAGNETISM.—Three lectures weekly for one semester. (Given in first semester 1907–08). Assistant Professor KINPP.

130b. EXPERIMENTS IN ELECTRICITY AND MAGNETISM.—A course of electrical and magnetic measurements, supplementary to 104b, and including measurements in the field of the more recent discoveries, such as electrical waves, electrical discharges in gases, etc. Two to five periods weekly both semesters. Assistant Professor KNIPP.

131. INVESTIGATION OF SPECIAL PROBLEMS. Advanced work in the laboratory or in design and calculation. A problem is chosen and work with the advice and direction of the instruc-

tor. One to five periods weekly for both semesters. Professor CARMAN, Assistant Professors KNIPP, WATSON and ———.

132. MATHEMATICAL PHYSICS.—Lectures and recitations in special topics in theoretical physics. (Not given in 1907–08). Professor CARMAN and ———.

133. SEMINARY AND THESIS.—Three to five periods weekly for both semesters. Professor CARMAN, Assistant Professors KNIPP, WATSON, and ———.

CHEMISTRY

COURSES FOR GRADUATES

Graduate students whose major subject is in some other department than chemistry before taking graduate work for credit in this department must have had the equivalent of 15 University credits in chemistry and the work covered must have included satisfactory work in general chemistry and in qualitative and quantitative analysis. Such students are advised to take chemistry 102, 5b, 5c, or 14. Courses of a more special nature will not, as a rule, be accepted for graduate work unless preceded by one of the above courses. Graduate students, who are candidates for an advanced degree in chemistry, must have had the equivalent of 30 University hours in chemistry and this must include satisfactory courses in general chemistry, qualitative and quantitative analysis, physical chemistry, and organic chemistry. Before receiving the degree of Doctor of Philosophy such students will be expected to complete work equivalent to courses 102, 14, 6a, 6b, 10a, 65, 69 and 111.

101. HISTORY AND THEORIES OF CHEMISTRY.—A discussion of the historical development of the science of chemistry. *I; (2)*. Dr. SMITH.

102. ADVANCED PHYSICAL CHEMISTRY.—A course of lectures and recitations on special topics for those students of chemistry and physics who desire more extended work in addition to course 31. Knowledge of differential calculus is desirable. It is recommended that this course be supplemented by at least three hours of laboratory work. *I, II; (2, 5)*. Assistant Professor LINCOLN.

103. ADVANCED INORGANIC CHEMISTRY.—A systematic presentation of descriptive inorganic chemistry, including the rarer elements and based on the periodic system. *I; (2, 5)*. Dr. BALKE.

104. PHYSIOLOGICAL CHEMISTRY.—This course is designed especially for students desiring a fundamental knowlege of the principles of physiological chemistry. It will consist of lectures, demonstrations, conferences, and assigned reading. The course will include a study of the fluids and tissues of the animal body, and the food stuffs which go to nourish the organism together with a detailed consideration of the processes of digestion, secretion, excretion, putrefaction, metabolism, etc. *II;* (*3*). Assistant Professor HAWK.

105. CHEMISTRY OF FLESH.—A course consisting mainly of laboratory work, in which students may specialize upon any of the following subjects: Chemistry of the cooking of meats losses involved in the cooking of meats; digestibility of meats comparative study of the methods for determining the nitrogenous constituents of meats; separation, purification, and estimation of the nitrogenous constituents of meats. *I or II;* (*5*, *15*). Professor GRINDLEY.

106. CALORIMETRY OF FUELS.—An advanced course in the study of methods for determining the heat values of solid, liquid and gaseous fuels. *I*, *II;* (*1-3*). Professor PARR.

107. WATER SUPPLIES.—A study of the sources of contamination of water supplies and the purification of water for potable or technical use. *I*, *II;* (*5*). Professor BARTOW.

111. THESIS WORK.—A thesis will usually be required of students taking the Master's degree and will always be required of students taking the degree of Doctor of Philosophy. As an illustration of the character of the work which may be done for thesis work the following list of investigations now in progress in the department is given.

PHYSICAL CHEMISTRY.—Professor NOYES, Change of weight in a chemical reaction. Assistant Professor LINCOLN, Vapor pressure of solutions, Electrolytic corrosion of brasses. Dr. SMITH, Chemical equilibrium between amalgams and solutions.

INORGANIC CHEMISTRY.—Dr. BALKE, New compounds of tungsten. Dr. HOLMES, Interaction of hydrochloric acid and manganese dioxide. Dr. SMITH, Reversible metallic displacements in aqueous solutions.

ANALYTICAL CHEMISTRY.—Dr. ISHAM, Determination of carbon and sulphur in iron and steel.

ORGANIC CHEMISTRY.—Professor NOYES, Molecular rearrangements in derivatives of camphoric acid. Assistant Professor CURTISS, Reaction of alcohols on mesoxalic ester. Derivations of malonic ester containing nitrogen.

SANITARY CHEMISTRY.—Professor BARTOW, Organic matter in river and deep well water. Standards of purity for water of Illinois. Efficiency of filtration of waters.

PHYSIOLOGICAL CHEMISTRY.

INDUSTRIAL CHEMISTRY.—Professor PARR, Weathering of Coal, Changes in coal on heating to moderate temperatures. Formation of calcium silicates at low temperatures. Mixtures of asphalt for technical purposes. Professor BARTOW, Softening of water.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

6a. METALLURGY.—A general course in metallurgical processes. Lectures and assigned reading. *I;* (*2*). Professor PARR.

6b. CHEMICAL TECHNOLOGY.—This is a course of lectures comprising a study of technological chemistry as illustrated in those industrie shaving a chemical basis for their principal operations and processes. Much use is made of the journals. *Thorp's Industrial Chemistry* is used as a guide. No laboratory work. *II;* (*2*). Professor PARR.

10a. SANITARY ANALYSIS.—Lectures on history, sources, contamination and standards of purity of potable waters and waters for industrial purposes, together with practice in analytical methods. *I;* (*2*). Professor BARTOW.

14. ORGANIC CHEMISTRY.—In this course the Aromatic Series is chiefly discussed by lectures and frequent quizzes. Especial attention is directed to its connection with the fatty series, the important reactions upon which the theory has been developed, and the synthetic and analytic methods used in determining the constitution and structure of all the important bodies of the series. Attention is given as well to the practical applications of the many substances of commercial value in this series. *Richter's Organic Chemistry.* This course must be accompanied by Chemistry 9b. *I;* (*3*). Assistant Professor CURTISS.

65. TECHNICAL GAS AND FUEL ANALYSIS.—Examination of gases, gas mixtures, flue gases and fuels. Determination of

calorific values and calculation of efficiencies. *I;* (*2*). Professor PARR.

69. ASSAYING.—The fire assay of lead, gold, and silver ores. Fluxes, re-agents, and charges are studied in connection with various typical ores, and practice given in use of the crucible and muffle furnaces and in the manipulations connected with fire assaying. *I;* (*1*). Mr. HOWE.

GEOLOGY

Special courses for graduates in field work and in Economic Geology are offered as the demands for such courses appear to require.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

2. ECONOMIC GEOLOGY.—A study of the manner of occurrence of minerals and rocks of economic importance, with special reference to those found in North America. *I;* (*5*). Associate Professor BAYLEY.

6. PHYSICAL AND OPTICAL MINERALOGY.—A direct introduction to the course in Petrography. The physical and optical properties of minerals are discussed in lectures and studied in the laboratory, with special reference to their relations with respect to symmetry. The larger portion of the work is devoted to the study of polarized light and its practical use in indentifying the rock forming minerals. *II;* (*3*). Associate Professor BAYLEY.

7. PETROGRAPHY.—The principles of course 6 are applied to the study of igneous rocks. *I*; (*3*). Associate Professor BAYLEY.

7a. PETROGRAPHY—Continuation of course 7, in which schists and sedimentary rocks become the objects of study. Incidentally some of the simpler processes of metamorphosis are discussed. *II;* (*3*). Associate Professor BAYLEY.

9. PALEONTOLOGY.—This course considers the history of organisms as revealed by the order and sequence of fossils occurring in the successive series of rocks. It deals with the laws concerning the relation of organisms to their environment; of fossils to the formation in which they are found; of physical changes to organic changes, or paleontology to stratigraphy. The interpretation of faunas and faunules, the migration of faunas, and the succession of fossil groups are discussed. The

economic and scientific uses of fossils are explained, and the phylogeny of certain groups of organisms are traced, using the fossils in the University collections. *II; (5)*. Assistant Professor SAVAGE.

16. STRATIGRAPHY.—In this course the principles of classification and nomenclature of rock formations are discussed, and the methods and criteria for correlation, employed in practical field work, are explained. The stratigraphy of the rocks of the Mississippi valley is studied, and the diagnostic fossils of the successive rock formations are described by the student in the laboratory in such a manner that he is able to recognize the characteristic species, and refer fossil bearing rocks outcropping in any locality in the state to their proper place in the geologic column. Geological maps are studied and the methods of making such maps explained. Practical field study and the mapping of the geology of some district are done by each student. *II; (5)*. Assistant Professor SAVAGE.

PHYSIOLOGY

COURSES FOR GRADUATES

101. PHYSIOLOGICAL JOURNAL CLUB.—This club is composed of the teaching staff of the department, the graduate students, and such undergraduates as are sufficiently advanced to participate. Recent articles of interest in current journals will be reported and discussed. This will give the student practice and confidence in presenting a condensed synopsis of a subject before a meeting. Each student will have to report a paper about once in two months. Time will be arranged, as far as far as possible, to suit the convenience of members of the club. Professor KEMP.

103. ORIGINAL RESEARCH.—Every facility and encouragement, so far as the resources of the laboratory and library permit, are offered to those prepared to avail themselves of these for researches as part of the work for the masters or doctor's degree, or for carrying on original work for publication. Professor KEMP.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

1. MAJOR COURSE.—This course is designed for medical students whose previous training has given them a broad founda-

tion in physics, chemistry, zoology and embryology. It embraces three lines of work, viz., histology (microscopic anatomy), physiological chemistry and physiology proper. It begins with a comprehensive study of the microscopic structure of the tissues in general, and later includes the structure of the organs in particular with special relation to their functions. This course gives the student a year's experience in technique and in the indentification of tissues under the microscope, and fits him especially to profit by advanced work in pathology—both general and surgical. The part of the field which is common to physiology and to physiological chemistry is covered, as far as possible, in the first semester, and a number of lectures are added to supplement the course which the student has already taken in organic chemistry (9 and 9c), thus making a course in physiologcal chemistry which is fairly complete. For the sake of laboratory work this course should be rounded out when possible, by elective work in physiology 2 or 7. Full credit in physiological chemistry on the medical course is not recommended unless such a supplementary elective course be taken. The work in physiology proper runs throughout the year. The wide scope of the course, as a whole, makes it impossible to cover the entire field, and give the proper amount of time for laboratory work. For this reason the physiology of the brain and of the special senses is not treated fully. These subjects are studied in advanced courses in the medical school, and the student can take them there in their proper place. The course is accompanied by many demonstrations, but for the benefit of the student these cannot take the place of personal experiments, so for this reason it is urgently recommended that Physiology 2 be elected when possible. *I, II;* (*5*). Professor Kemp, Dr. Stanley.

2. Advanced Course.—This course is designed for students who wish to get as thorough a training as possible for the study of medicine. It is supplementary to Physiology 1 and can best be taken the year after Physiology 1 is completed, but may also be taken parallel with Physiology 1 by arrangement with the head of the department. The course consists of lectures, assigned reading, and experiments. The experiments are conducted mostly by the students working in small groups, and conferences on the results of such experiments are held from time to time under the direction of the instructor. Toward

the end of the first semester about two hours a day for six weeks is devoted to urine-analyis. The student taking this is relieved from the ordinary routine work in such courses in the College of Medicine, and may devote his time there to cases of special interest. The work in this course also gives considerable experience in operative surgery, in the methods employed in studying the action of drugs and in the use of apparatus for the finer kinds of clinical diagnosis. *I, II;* (*5*). Professor KEMP, Dr. STANLEY.

5. SPECIAL PHYSIOLOGY.—This course is given to meet an emergency, which sometimes arises, where a student wishes to take up a special line of work not specified in one of the other courses, and not involving the preparation of a thesis. At the discretion of the head of the department students may register for such work. Arrange details with the instructor.

7. PHYSIOLOGICAL CHEMISTRY.—For students who have not the time, or who can not fulfil all the requirements, for Physiology 1 and 2. It consists of lectures given in Physiology 1, and laboratory work given in Physiology 2, and in cludes urine-analysis. Students taking this course must be prepared to be present daily, the fourth hour, with Physiology 1. When this class is engaged on non-chemical work the students in 7 will be excused. The laboratory hours must be in the afternoon while the class in Physiology 2 is covering the same ground. During the months of December and January, the students must be able to arrange one hour daily in common with Physiology 2. *I, II;* (*7*). Professor KEMP, Dr. STANLEY.

8. HISTOLOGY.—This is the histological part of Physiology 1. It may be taken by those who can not meet the requirements for that course. Students who register in 8 must be present daily with Physiology 1 at the third hour, and, when demonstrations are given which last for two hours, they will be expected to remain during the fourth hour also. When Physiology 1 is engaged on other work, during the third hour, the students in 8 will excused. *I, II;* (*2 1-2*). Professor KEMP.

ZOOLOGY

COURSES FOR GRADUATES

103. GENERAL EMBRYOLOGY.—Lectures, conferences, and laboratory work. The lectures will deal with general embryolo-

gical topics in advance of those treated in Zoölogy 3, including the history of the germ cells, maturation and fertilization, theories of development and inheritance, and recent experimental researches in the mechanics of development and the correlative differentiation of organs. The laboratory work will consist of a study of the early development of invertebrate types. *II;* (*Lectures 2 hours weekly; laboratory 8 hours weekly*). Dr. McClellan.

115. Variation and Heredity.—A course which includes lectures on the methods and results of recent investigations in the study of variation and heredity, with assigned problems requiring individual work on some some phase of the subject. *I.* Associate Professor Smith.

116. Chemical Zoology.—Laboratory work, a study of literature, and conferences. This course includes an investigation of a biochemical problem dealing with enzymes or with the related topic of carbohydrate metabolism. The problem may pertain to the origin and distribution of enzymes, their chemical nature, their mode of action, or their physiological significance; or to the nutrition of invertebrates and the lower vertebrates, with special reference to carbohydrate metabolism. *I, II;* (*Daily*). Dr. Peters.

117. Faunistic Zoology.—Problems in taxonomy, distribution, or ecology selected from the field of the zoölogy of the state. These studies will be accompanied by field work, conferences, and lectures. *1, II;* (*3 to 5 times a week*). Professor Forbes and Associate Professor Smith.

119.—Physiological Zoology.—Conferences, study of literature, and laboratory investigation on one of the following topics: (a) the general physiological relations between the tissue cell or the free living cell and its liquid medium: The application of the theories of crystalloidal and colloidal solution to biological problems of a general character, such as osmosis, cell metabolism, and the biochemical aspects of cellular activity; (b) the physiology of the Protozoa, including the conditions of their nutrition and division, the action of chemical and physical stimuli upon their motor and nutritive functions, and the relation of these organisms to sanitary and pathological problems. *I, II;* (*Daily*). Dr. Peters.

121. Individual Research Courses.—a. Systematic, faunistic, and ecological zoology. Professor Forbes and Associate Professor Smith.

b. Morphological, systematic, and physiological entomology. Dr. Folsom.

c. Chemical and physiological zoology. Dr. Peters.

d. Vertebrate and invertebrate embryology. Dr. McClellan.

e. Structure and development of the nervous system. Animal behavior. Dr. Carpenter.

ENTOMOLOGY

103. Faunistic Entomology.—Entomological studies parallel to those of course 117 in zoology. *I, II; (Daily)*. Professor Forbes and Dr. Folsom.

Courses for Graduates and Advanced Undergraduates

2. Vertebrate Zoology and Comparative Anatomy.—In the laboratory work of this course principal attention will be given to the anatomy of Necturus and to anatomical and systematic studies of fishes, birds and mammals. The course will contain lectures on the general theory of evolution with more attention to the evidences furnished by the anatomy and embryology of the vertebrates and especially of man. The ordinary technique of section cutting and staining will be included in the course. *II; (5)*. Associate Professor Smith, Dr. Carpenter.

3. Vertebrate Embryology.—This course begins with a study of the sex cells, fertilization, and the early stages in the development of the egg. The formation of the organs of the vertebrate body and of the fetal membranes is then considered in detail, with lectures on the development of the chick, and assigned reading in a text-book of human embryology. The laboratory work includes the preparation of embryological material and the study of serial sections of chick and pig embryos. *I, II; (3)*. Dr. Carpenter.

4. Zoological Theory. Lectures and assigned readings on the facts, problems, and theories of evolution and development, and the related topics of variation, heredity, and selection. *I; (3)*. Associate Professor Smith, Dr. Folsom.

5. Animal Behavior.—Lectures and demonstrations on the reactions of the lower animals to external stimuli. The results

of experimental work on the influence of light, heat, gravity, chemical substances, etc., are considered with reference to the habits of animals in their normal environment. The course will include such studies of sense organs and adaptive structures as may be necessary. *I; (2)*. Dr. CARPENTER.

6. MICROSCOPICAL TECHNIC.—This course is intended to make students familiar with special methods of zoological technic, including the theory and practice of fixation, sectioning, and staining tissues for cytological study, and the laboratory methods used in zoological research. *I; (3)*. Dr. MCCLELLAN.

7. THE STRUCTURES AND FUNCTIONS OF THE VERTEBRATE NERVOUS SYSTEM.—Lectures and laboratory work on the structure of the vertebrate nervous system, including a study of the grouping and chaining of the neurones to form the central and peripheral nervous organs, of the nervous impulse of the stimulation of the sense organs, and of various reflex actions. The work will include dissections, practice in the preparation of nervous tissues for the microsope, and experimental work on nervous physiology. *II; (3)*. Dr. CARPENTER.

15. VARIATION AND HEREDITY.—A course of lectures and reference reading designed to give a general survey of the results obtained by the application of modern statistical methods in the study of variation and heredity. A knowledge of the methods is acquired from lectures and from exercises in handling data gathered from various sources. For accompanying laboratory work see 15a. *I; (2)*. Associate Professor SMITH.

15a. STATISTICAL DATA.—Laboratory work involving the collection of data suitable for a study of the variations and correlations of structure in some suitable organism may be elected in connection with course 15. The extensive collections of insects, fishes and plankton material in the possession of the State Laboratory of Natural History are available for the purpose of this course. *I; (1 to 3)*. Associate Professor SMITH.

16. CHEMICAL ZOOLOGY.—This course will deal with those chemical conditions of protoplasm which are more or less common to all living matter. Biological processes will be studied from the point of view of the chemical principles which underly them. The first part of the course will treat of the relation between the cell and a solution as its medium. Special attention will be given to osmotic pressure and the theories of solution

with reference to physiological processes. The latter part of the course will be given to ferments—their origin, nature, mode of action—and to the treatment of enzymes according to the general chemical principles applicable to catalytic processes. Lectures, laboratory and assigned reading. Those who are prepared may pursue a problem leading to a thesis but for others the work is intended to be sufficiently elementary for beginners. For prerequisites consult the instructor. Either semester's work may be taken separately. *I, II; (3 to 5)*. Dr. PETERS.

17a. FIELD ZOOLOGY.—A course in which the main object will be to gain as comprehensive a knowledge as practicable of the animal life of a restricted locality. Collection, preservation, and identification of various kinds of animals, together with observations of the habits, life histories, and relations to enviroments of selected forms, will constitute the major part of the work. The phases of the subject receiving most attention will vary with the make-up of the class and with the kind of locality selected, but in any event the work will be planned as to make it a desirable course for prospective teachers of zoology. *I; (3)*. Associate Professor SMITH.

17c. ADVANCED FIELD ZOOLOGY.—This course is a continuation of 17a, and provides an opportunity for more intensive work on more restricted problems in connection with the local fauna. A taxonomic, distributional, or ecological problem will be studied, and the work may be made introductory to subsequent investigation in this field. *II; (3 to 5)*. Associate Professor SMITH.

18. MICROSCOPIC ORGANISMS.—This course has for its object matter the minute aquatic life of fresh water with special reference to those organisms which have a relation to sanitary problems. The first part of the course is occupied with the identification, collection, numerical estimation, and the life-history and interrelation of these forms Selected examples are then studied under experimental conditions with special reference to sanitation. The general chemical and physical conditions which govern the life of organisms in an aquatic environment are considered. The methods practiced and proposed for the control of the biological content of the fresh waters will be described and so far as possible illustrated by experiment. *I; (5)*. Dr. PETERS.

19. PHYSIOLOGICAL ZOOLOGY.—This course will deal with the general principles of animal physiology as illustrated by the zoological groups. The nutritive, formative, and sensori-motor processes, as exhibited from Protozoa to man, will be studied with special reference to the cellular activities involved, and to the general principles common to protoplasmic processes. Laboratory work may be done by arrangement with the instructor. *I, II; (3 or 5).* Dr. PETERS.

20. CURRENT LITERATURE.—The instructors and advanced students of the department will meet at stated intervals as a journal club for the presentation and discussion of the results of recent zoological investigation. This course is open to all qualified students of zoology, and should be taken by those intending to graduate with a thesis. *I, II; (1).*

ENTOMOLOGY

2. GENERAL ENTOMOLOGY.—This course and Entomology 3 form a year's connected major work in entomology, covering substantially the whole field. The present course is devoted mainly to field entomology in the fall and later to the morphological and physiological aspects of the subject. Beginning with the collection and preservation of specimens and the making of field observations, it is continued by laboratory studies of typical insects, made with special reference to the recognition of adaptive structures, and experimental work intended to determine their exact utilities. *I; (5).* Dr. FOLSOM.

3. GENERAL ENTOMOLOGY.—To be taken either with or without the preceding course. The classification and determination of insects, the study of life histories in the insectary and by field observation, and the collection of information with respect to the œcological relations of insects, are the principal objects of this course. *II; (5).* Dr. FOLSOM.

5. ADVANCED ENTOMOLOGY.—Under this head students desiring advanced work in entomology, especially as a preparation for thesis work in this subject, will be individually provided for on consultation with the entomological instructors. The course may be made to cover one or two semesters and to earn a three-hour or a five-hour credit in each. At least a three-hour course for one semester will be required as a preparation for entomological thesis work. *I, II; (3 to 5)* Professor FORBES or Dr. FOLSOM.

7. Systematic Entomology.—This course, while primarily entomological, is designed to be of general use to students of biology. The lectures include a historical and critical survey of the systems of classification; a discussion of the aims and methods of classification; the nature of species, genera, and other groups, and the rules of nomenclature; the preparation of taxanomic articles, involving the study of bibliography, synonymy, analytical keys, etc. These subjects receive practical treatment in the laboratory, and to qualified students the unworked material of the State Laboratory of Natural History is available for study. *I, II; (3)*. Dr. Folsom.

E Engineering

ARCHITECTURE

Courses for Graduates

A. Construction.

101. Large wooden buildings.
102. Uses of stone and of ceramic products.
103. Steel frame buildings.
104. Fire-proofing buildings.
114. Slow-burning buildings.
124. Plain and reinforced concrete buildings.

B. Sanitation.

105. In public buildings.
108. Systems of heating and ventilation.
123. Electric wiring and lighting.

C. Drawing.

107. Advanced graphic statics.
113. Stereotomy.
117. Advanced perspective.
120. Advanced water color painting.

D. Design.

106. Evolution of architectural styles.
109. Advanced architectural design.
110. Applied esthetics.
119. Industrial design.

E. Practice.

111. Translation of an architectural book.
112. Indexing and classification of data.

115. Architectural photography.
116. Methods of producing drawings and specifications.
118. Specifications and estimates for large buildings.
121. Office arrangement and methods.
122. Any approved graduate study in College of Engineering.

CIVIL ENGINEERING

Courses for Graduates

The following subjects indicate the lines of thesis work which may be taken up.

(All primary unless otherwise stated.)

101. Railway location and construction.
102. Railway track and structures, and their maintenance.
103. Yards and terminals.
104. Motive power and rolling stock.
105. Signal engineering.
106. Railway operation and management.
107. Bridge designing.
108. Cantilever and swing bridges.
109. Metallic arches.
110. Metallic building construction.
111. Roof construction.
112. Stereotomy.
113. History of the development of bridge building—secondary.
114. Water power development.
115. Reinforced concrete construction.
116. Engineering jurisprudence.
117. Masonry construction.
118. Advanced graphic statics.
119. Roads and pavements.
128. Practical astronomy.
129. Description of work done.
130. Critical description of engineering construction.
131. Translation of Technical Engineering works from French or German.
132. Any primary in Theoretical and Applied Mechanics or Municipal and Sanitary Engineering.

133. Any primary in Mathematics, Mechanical Engineering, or Electrical Engineering—secondary.
134. Indexing of Civil Engineering periodical literature—secondary.

MECHANICAL ENGINEERING

Courses for Graduates

M. E. 102. Modern Shop Methods and Management—This course includes a study of modern methods of construction; special tools and processes; cost-keeping; payment of labor, and kindred topics. Lectures on organization and management are given. *I, II; (2)*. Professor Breckenridge and Assistant Professor Gill.

M. E. 106. Heat Motors and Refrigerating Machinery.—A continuation of course 6. Special emphasis is laid on the advanced theory of the internal combustion motor, and of the steam turbine. The general principles and methods of refrigeration are studied. *II; (3)*. Associate Professor Goodenough and Assistant Professor Thorpe.

M. E. 107. Advanced Thermodynamics.—The general principles of thermodynamics are developed and applied to the solution of various physical problems including combustion. A study is made of irreversible processes, conditions of stability, thermodynamic potential and its applications, and changes of state of aggregation. *I; (2)*. Associate Professor Goodenough.

M. E. 109. Advanced Machine Design.—Individual problems are assigned so that the student may specialize along the line of his inclination. The course also includes the general theory of rational design and the application of Mechanics of materials to design. *I, II; (3)*. Assistant Professor Leutwiler.

M. E. 112. Laboratory Investigations.—This course consists of special investigations of problems relating to combustion of fuel, boiler economy, steam engines and turbines, gas engines and producers, properties of explosive mixtures, mechanical refrigeration, etc. Emphasis is laid upon original work. *I, II; (3)*. Assistant Professor Thorpe.

M. E. 114. Engineering Design.—The student is required to make a design with estimates and specifications of a complete engineering project, such as a manufacturing plant, a

power plant, or a pumping station. *I, II; (3)*. Assistant Professors THORPE and LEUTWILER.

MECHANICS, THEORETICAL AND APPLIED

COURSES FOR GRADUATES

101. Analytical mechanics.
102. Resistance of materials.
103. Hydraulics and Hydraulic Engineering.
104. Experimental work in laboratory of Applied Mechanics.
105. Experimental and analytical work in Reinforced Concrete.

In the courses named above advanced work will be outlined to meet the requirements of individual cases.

MUNICIPAL AND SANITARY ENGINEERING

COURSES FOR GRADUATES

102. WATER SUPPLY ENGINEERING.—Advanced work in Water supply Engineering will be arranged to fit the conditions of individual classes. Sources and requirements of water supply general water works construction, pumps and pumping, design of reservoirs and elevated tanks, and water works operation and the valuation of plants are among the topics which may be treated. Professor TALBOT.

103. SEWERAGE.—General sewerage design and construction, a study of sewerage systems, hydraulics of sewers, and a study of run-off are examples of the work which may be taken up.

106. WATER PURIFICATION, SEWAGE DISPOSAL AND GENERAL SANITATION.—The design, construction, and operation of water purification plants and of sewage disposal works, the study of existing plants, comparison of results and cost of construction and operation may be taken up in this course. Experimental work on water filters, septic tanks, etc, may be included. Garbage disposal and general sanitation may also be taken.

RAILWAY ENGINEERING*

RAILWAY MECHANICAL ENGINEERING

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

1. LOCOMOTIVES.—A study of the constructive features of the locomotive in its various parts and their relations. Develop-

*For Railway Administration see under Economics.

ment of types, their limitations and adaptations. Selection of type and outline of principles of design for specified service. Other railway motors. *I; (2)*. Associate Professor SCHMIDT.

2. LOCOMOTIVE DESIGN.—Calculations and design of engine, boiler and carriage details. Study of current standards and proportions. Drafting room system. *I; (3)*. Associate Professor SCHMIDT, Assistant Professor LEUTWILER.

4. LOCOMOTIVE ROAD TESTS.—Arrangements for locomotive road tests have been perfected with several roads entering Champaign and Urbana. Several locomotives have been equipped for this work and tests made in actual service conditions. This work is facilitated by the use of the railway test car owns ed by the University. The course includes also brake test and other laboratory work. *I; (3)*. Associate Professor SCHMIDT, Mr. WENGER.

5. SHOP AND AUXILIARY EQUIPMENT.—Shop tools. Compressed air in shop service. Pumping plants. Water supply and purification. Construction and operation of the air-brake. This course is supplemented by inspection and tests of plants in service. The department owns sufficient air-brake equipment for demonstrations, and the courtesy of the instructors in charge of the airbrake cars of the Illinois Central Railroad Company and the Cleveland, Cincinnati, Chicago & St. Louis Railway Company makes these cars also available for instruction. *II; (1)*. Associate Professor SCHMIDT.

7. ADVANCED DESIGN.—Advanced problems in locomotive and car design and shop arrangement. Special machinery and auxiliary equipment. *II; (3)*. Associate Professor SCHMIDT, Assistant Professor LEUTWILER.

8. DYNAMOMETER CAR TESTS.—Investigations, in regular passenger and freight service, of locomotive tractive effort and train resistance. Tonnage rating problems. Resumé of train resistance experiments. *II; (1)*. Associate Professor SCHMIDT, Mr. WENGER.

10. SEMINARY.—Discussion of current topics and review of railway journals. Assigned topics and reports *I*, *II*; *(1)*. Associate Professor SCHMIDT.

30. THESIS.—Original investigation, report and discussion. Research or experiments, or both. *II; (3)*. Associate Professor SCHMIDT, Mr. WENGER.

RAILWAY CIVIL ENGINEERING

31. RAILWAY YARDS AND TERMINALS.—Instruction is given in the methods of proper location of yard tracks to insure efficiency of operation. The course includes a consideration of the details of track construction as well as that of the general question of yard design. *II; (1)*. Mr. ———.

32. RAILWAY STRUCTURES.—Each student makes a set of drawings of the details of railway structures, the dimensions being of his own measurement. He afterwards is given problems in original design which are criticized and corrected. *II; (1)*. Mr.———.

33. ECONOMIC THEORY OF RAILWAY LOCATION.—This course includes a study of the influence of location upon the net earning power of a line of railway. *I; (4)*. Mr.———.

34. RAILWAY OPERATION.—Instruction is given in the duties of the various departments and officers of a railway; and the routine of the work done is considered in some detail. *II; (4)* Mr.———.

35. SIGNAL ENGINEERING.—A study is made of the general arrangement of automatic block signals on single and double track lines, and of interlocking systems for terminals as well as of the details of construction and of operation. *II; (1)*. Mr———.

50. SEMINARY.—A weekly meeting for the presentation and discussion of papers on a prearranged course of reading. This work is supplementary to that of the class room, and includes reviews of current engineering literature and of standard works of interest to railway engineers. *II; (1)*. Mr.———.

60. THESIS.—The preliminary work is begun early in the first semester and a credit of one semester hour is allowed for weekly reports of progress. The work is continued through the second semester and weekly conferences and reports are required. A credit of two semester hours is allowed for the work in the second semester. *I; (1)*. *II; (2)*. Mr.———.

RAILWAY ELECTRICAL ENGINEERING

61. TRACTION.—Construction and equipment of electric railways; relative economy of steam and electric traction. Limitations and adaptations of steam and electric traction as determined by character of location, traffic and service. *II; (2)*. Mr. WENGER.

62. Railway Laboratory and Road Tests.—Electrical laboratory problems and electric car tests of power consumption, resistance, acceleration and braking. *I; (2)*. Mr. Wenger.

63. Railway Laboratory and Road Tests.—A continuation of course 62, consisting principally of road tests with the electric car. *II; (2)*. Mr. Wenger.

F Agriculture

AGRONOMY

Courses for Graduates

101. Systems of Soil Investigation; Sources of Error and Method of Control, Interpretation of Results. Professor Hopkins.

102. The World's Supply of Plant Food Materials, Including Methods of Utilization. Professor Hopkins.

103. Different Systems of Agricultural Practice and their Ultimate Effect upon the Soil. Professor Hopkins.

104. Drainage Waters; Surface and Sub-Drainage, with Special Reference to Soil Fertility. Professor Hopkins.

105. Detailed Study of Soil Investigations in Progress in Illinois. Professor Hopkins.

106. Soil Types; Methods of Surveying and mapping.—The work may include field practice. Assistant Professor Mosier.

112. Plant Breeding, Including a Detailed Study of Experiments at this Station, and of Methods and Results Reported from Other States and from Foreign Countries. Assistant Professor Smith.

Courses for Graduates and Advanced Undergraduates

9. Soil Physics and Management.—Effects of the different methods of treatment of soils and the influence of these methods upon moisture, texture, aeration, fertility, and production. Review of the origin of soils and the various methods of soil formation; a study of their mechanical composition and classification; of soil moisture and means for conserving it; of soil texture as affecting capillarity, osmosis, diffusion, and as affected by plowing, harrowing, cultivating, rolling, and crop-

ping; of the wasting of soils by washing; fall or spring plowing and drainage as affecting moisture, temperatures, and root development. Class and laboratory work, comprising the determination of real and apparent specific gravity, water holding capacity and capillary power of various soils; the study of the physical effects of different systems of rotation and of continuous cropping with various crops, and the mechanical analysis of soils, etc. *I; (5)*. Assistant Professor MOSIER and Mr. WILLIS.

12. SOIL FERTILITY, FERTILIZERS, ROTATIONS.—The influence of fertility, natural or supplied, upon the yield of various crops; effect of different crops upon the soil and upon succeeding crops; different rotations and the ultimate effect of different systems of farming upon the fertility and productive capacity of soils; supplemented by a laboratory study of manures and fertilizers, their composition and their agricultural and commercial value; of soils cropped continuously with different crops; and with a series of crops; of the fertility of soils of different types, or classes from different sections of Illinois. *II; (5)*. Professor HOPKINS.

15. COMPARATIVE AGRICULTURE.—Reasons for the differences in the agriculture of different times, peoples, and countries, and why it is that the agriculture of a region or of a farm is a definite and individual problem, together with the need of harmonizing agricultural practice with natural conditions and the findings of science. Circumstances that influence agricultural practice, as soil, climate, machinery, race, custom, land tenure, etc.; what is best under different conditions. Lectures. *II; (1)*. Professor DAVENPORT.

16. GERMAN AGRICULTURAL READINGS.—A study of the latest agricultural experiments and investigations published in the German language, special attention being given to soils and crops. The current numbers of German journals of agricultural science are required and used as a text. This course is designed to give the student a broader knowledge of the recent advances in scientific agriculture, and incidentally, to aid him in making a practical application of a foreign language. *II; (2)*. Professor HOPKINS.

18. INVESTIGATION AND THESIS.—This course varies in the subject matter according to the lines in which theses are written. *I, II; (5-10)*.

ANIMAL HUSBANDRY

Courses for Graduates

103. Live Stock Experimentation.—Objects, methods and sources of error in experimental work dealing with the feed ing, breeding, and management of farm animals. Detailed study of live stock experiments in progress at this Station, and a survey of past and present work in this line by the various experiment stations of the world. Professor Mumford.

104. Meat.—Special investigations relating to the quality and amount of meat and by-products yielded by cattle, sheep, and swine under various conditions of feeding, breeding and management, with reference to improvement in quality of such products. Mr. Hall.

106. Swine.—Type of swine as determined by environment, by feed, and by market demands. Assistant Professor Dietrich.

110. Animal Nutrition.—(Chemical). The course also includes a thorough study of the chemical changes, reactions and processes involved in the activities of animal life, namely, mastication, digestion, absorption, assimilation, disassimilation, respiration, circulation, secretion, and reproduction. *I, II.* Professor Grindley and Professor Hawk.

111. Animal Nutrition.—(Physiological). Detailed studies of the physiology of muscle, nerve, blood, bone, and of the organs and products of secretion, digestion and respiration. This course also includes metabolism in the various nutrients of food-stuffs for maintenance, growth, fattening, and milk production. *I, II.* Professor Grindley and Professor Hawk.

112. Animal Nutrition—(Bacteriological). Investigation in the field of bacteriology as related to Animal Husbandry, including studies of the microörganisms of fundamental importance to animal life and those of a pathological nature. This course also includes studies of the ferments, enzymes, toxins, and ptomaines occurring in healthy and pathological tissues and fluids of the animal body. *I, II.* Professor McNeal.

113. The Animal Body In Health And Disease.—Research upon the parasitic bacteria and protozoa and their relation to the animal body in health and disease. Professor McNeal.

114. Meat Preservation.—Investigation of the bacteria related to the ripening and decomposition of animal food pro-

ducts with especial attention to the methods of meat preservation. Professor McNeal.

Professor McNeal will accept graduate students in but one of the courses assigned to him during any given year.

Courses For Graduates And Advanced Undergraduates

7. Principles of Animal Nutrition.—The functional activities of the animal body and the end products of their metabolism. Foods are considered first chemically, as affording materials for the construction of the body tissues or of animal products, as meat, milk, wool, etc.; second, dynamically, as supplying the potential energy for the body processes and for external labor; third, as to the fertilizing value of their residues. *I; first half daily; 10* (*2 1-2*) Assistant Professor Dietrich.

12. Breeds of Beef Cattle.—The history, development, and characteristics of the breeds suitable for beef production. Tracing pedigrees and a critical study of the same. A study of breed type as exemplified in individual animals in the University and other herds. *II; first half; daily; 9;* (*2 1-2*) Professor Mumford.

114. Management of Pure-Bred Herds, Flocks And Studs.—A study of the methods of the most successful breeders as to housing and management; the selection and fitting of animals for sale and for the show ring; advertising and disposal of surplus stock. *II; second half; daily; 9;* (*2 1-2*). Professor Mumford.

22. Advanced Stock Judging.—A study of animal conformation with reference to market and show yard form, quality, and condition. A course intended to render the student expert in his judgment in the selection of horses, beef cattle sheep, and swine, for feed lot, market and exhibition, and to qualify him as a competent judge at live stock shows. *II*; *daily*; (*3*).

DAIRY HUSBANDRY

Courses for Graduates

101. A special study of differences in the efficiency of dairy cows, cause and effect of the same, and the relation these bear to successful dairy farming. Professor Fraser.

105. A study of the control of the water, salt and caseine contents of butter and the relation they bear to the marketable product. Assistant Professor Lee.

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

7. FACTORY MANAGEMENT.—This course is designed especially for creamery butter makers, factory cheese makers, and others wishing a more extended course in butter and cheese making than is offered in the other courses. It includes the study of special problems connected with the manufacture of butter and cheese; the management of creameries and cheese factories under private and co-operative ownership; olcating, planning, building, equipping, and operating plants; creamery and cheese factory sanitation and products. Lectures, assigned readings, and laboratory work. *II; second half;* (*3*). Assistant Professor LEE.

8. CITY MILK SUPPLY.—Proper methods of handling and preparing milk and cream for direct consumption; preventing contamination, pasteurizing, standardizing, modifying, bottling transporting, and delivering. Certified milk; value of milk as a food. Milk commissions; legal requirements of cities and states. Lectures, reference readings, and laboratory practice.. *II; second half;* (*2 1-2*).

11. DAIRY BACTERIOLOGY.—The relation of bacteria to the dairy industry, showing where and to what extent milk may become contaminated; how contamination may be largely avoided. The relation of bacteria to the changes that take place in milk; the effect of methods of handling and of temperature upon the bacterial content of milk. The part that bacteria play in the manufacture of butter and cheese. The course consists largely of laboratory work, lectures and assigned readings. *I; first half;* (*2 1-2*).

12. INVESTIGATION AND THESIS.—Subject arranged with instructor. (*5*, *10*). Professor FRASER, Assistant Professor LEE.

19. BUTTER MAKING.—A study of the different systems of creaming milk and a comparison of different cream separators as regards efficiency under varying conditions; pasteurization; the use of different kinds of lactic ferments; ripening cream, churning; working; packing and scoring butter. *I; first half; II; first half;* (*3*). Assistant Professor LEE.

20. COMPARATIVE DAIRYING.—Dairying in different countries. The present condition of dairying in the United States, its magnitude and relation to other lines of farming. The in-

fluence of soil, climate, market conditions and location in determining special lines of dairy development. A study of experiment station literature. Lectures and assigned readings. *II; first half; (3).* Mr. HAYDEN.

21. ECONOMIC MILK PRODUCTION.—Difference in efficiency of individual cows showing the real relation of the cow and the herd to the profits derived from milk production. How to establish and perpetuate a dairy herd of the highest efficiency. A comparison of different rations for economic milk production. Crops to raise on a dairy farm and bearing this has on the economy of the ration. Organization of a dairy farm and a study of the whole conduct of the business of producing and disposing of milk at the greatest possible profit. *II; (5).* Professor FRASER.

HORTICULTURE

COURSES FOR GRADUATES

Exceptional opportunity is afforded for exhaustive studies in problems concerning orchard management, spraying, packing, storing and marketing of fruits and vegetables. There is also ample provision for research work in certain phases of landscape gardening and forestry.

At least two years of collegiate work in horticulture and allied subjects and the requisite preparation for the chosen subjects are required for entrance upon major work in this department.

101. POMOLOGY.—Studies of special problems regarding the relationship, adaptations, improvement, propagation, cultivation, pruning, protection, preservation or marketing of orchard fruits. *Arrange time.* Professor BLAIR and Associate Professor CRANDALL.

102. POMOLOGY.—Studies of special problems regarding the adaptations, propagation, cultivation or pruning of small fruits. *Arrange time.* Associate Professor CRANDALL.

103. OLERICULTURE.—Studies of special problems regarding the structure, cultural requirements, and improvement of vegetables. *Arrange time.* Assistant Professor LLOYD.

104. FORESTRY.—Problems in general forestry and investigation of forest growths. *Arrange time.* Professor BURRILL.

COURSES FOR ADVANCED GRADUATES AND UNDERGRADUATES

6. NURSERY METHODS.—A study of some details of nursery management and their relation to horticulture in general. Lectures and reference readings. *II; first half; daily, 3; (2 1-2).* Associate Professor CRANDALL.

7. SPRAYING.—The theory and practice of spraying plants, embracing a study of materials and methods employed in the combating of insects and fungous diseases. Recitations, reference readings, and laboratory work. *II; second half; daily; 1; 2 1-2.* Assistant Professor LLOYD.

8. ORCHARDING.—A comprehensive study of pomaceous fruits (apple, pear, quince), and drupaceous or stone fruits (plum, cherry, peach, nectarine, apricot). Each fruit studied with reference to the points enumerated under 2 above. Lectures, textbooks, and laboratory work. *II; Recitations; daily; 10; (5).* Associate Professor CRANDALL.

10. LANDSCAPE GARDENING.—A course in ornamental and landscape gardening with special reference to the beautifying of home surroundings. Lectures illustrated by means of lantern slides, reference readings, practical exercises in the arrangement of home grounds and an out-of-door familiarity with the ornamental plants of the vicinity. The work of the first semester is repeated the second semester. *I, or II; Sat.; 10, 11; Section A, F.; 2; Section B, F.; 3; Section C, Sat.; 9; (3).* Assistant Professor WYMAN.

12. EVOLUTION OF HORTICULTURAL PLANTS.—Comprising a study of organic evolution and the modification of plants by domestication. *I; second half; daily; 10; (2 1-2).* Associate Professor CRANDALL.

18. EXPERIMENTAL HORTICULTURE.—A course for those intending to engage in professional horticulture or experiment station work. *I; daily; 8; (5).* Professor BLAIR, Assistant Professor LLOYD, Associate Professor CRANDALL.

24. LANDSCAPE HORTICULTURE.—Exhaustive studies of ornamental plants and methods of grouping the same for the effective planting of public and private grounds. *I, II; arrange time, Friday or Saturday; (2).* The *work may be begun in either semester.* Assistant Professor WYMAN.

THREMMATOLOGY

COURSES FOR GRADUATES AND ADVANCED UNDERGRADUATES

1. The principles of evolution as applied to the improvement of domesticated animals and plants. Variation, its extent and causes. Relative stability and instability of living matter. Reflex action, habit, and instinct, as bearing upon the question of inheritance of acquired characters. The origin, correlation, and disappearance of characters. Transmission and the law of heredity as developed by the statistical method of study. Power of selection to modify type. *II;* (*5*). Professor DAVENPORT.

2. INVESTIGATION AND THESIS.—*I or II;* (*5*). Professor DAVENPORT.

STUDENTS

FELLOWS AND SCHOLARS

1907–1908

Allinson, May.....Champaign
A. B., University of Illinois, Fellow in History.
Bennett, Elizabeth Ruth..... .E. Stroudsburg, Pa.
A. B., Ohio University, Scholar in Mathematics.
Brownson, Howard Gray..... .....Centralia
A. B., University of Illinois, Fellow in Economics.
Carter, Clarence Edwin.....Urbana
A. M., University of Wisconsin, Fellow in History
Dancey, Lloyd Slote.....Fairbury
A. B., University of Illinois, Scholar in Physics.
Day, Anna Edith.....Jacksonvillle
A. B., Illinois College, Scholar in Classics.
Drew, Rosa Sophia..... Grinnell, Ia.
A. B., Iowa College, Scholar in Botany.
Egy, Willard Leo.....Urbana
B. S., University of Illinois, Fellow in Physics.
Flint, Percy Wightmann.....Charleston, S. C.
B. S., College of Charleston, Fellow in Chemistry.
Forbes, Ethel Clara.....Urbana
A. B. University of Illinois, Scholar in French.
Francis, Charles Kenworthy.....Urbana
Ph. B., Brown University, A. M., Brown University,
Fellow in Applied Chemistry.
Harrison, Bruce Magill.....Ottawa, Kans.
B. S., Ottawa University, Scholar in Zoölogy.
Henninger, Carl.....Indianapolis, Ind.
A. B., University of Indiana, Scholar in Modern Languages.
Hoff, Hans Jacob..... ..... Rexford, Kans.
A. B., Bethany University, Fellow in Modern Languages.
Homberger, Alfred Wilhelm.....Sauk City, Wis.
A. B., University of Wisconsin, Fellow in Chemistry.

Jaeck, Emma Gertrude .....Monmouth, Ill.
B. L., University of Wisconsin, Fellow in German.
Jenney, Adeline M.....Yankton, S. D.
A. B., University of Wisconsin, Fellow in English.
Johnson, Mabel Clare.....Arkadelphia, Ark.
A. B., Ouachita College, Scholar in Modern Languages.
Lane, Michael A.....Chicago
B. S., University of Chicago, Fellow in Physiology.
Layton, Katherine Alberta W.....Canton
A. M., University of Illinois, Fellow in German.
Lowrie, Seldon Gale.....Galesburg
A. B., Knox College, Scholar in Political Science.
Moore, Blaine Free.....Cherryvale, Kans.
A. B., University of Kansas, Scholar in Political Science.
Morrison, Harry Cleveland.....Hazleton, Ind.
A. B., University of Indiana, Scholar in Mathematics.
Noerenberg, Clarence Eugene.....Highland Park
B. S., University of Illinois, Fellow in Architecture.
Owen, Mary Elizabeth Hodges.....Chicago
A. B., University of Wisconsin, Scholar in Modern Languages.
Petty, Luther Ewing.....Aspen Hill, Tenn.
A. B., Wabash College, Scholar in Mathematics.
Reynolds, Ernest Shaw.....Providence, R. I.
Ph. B., A. M., Brown University, Fellow in Botany.
Shoop, Adaline Margaret.....Abingdon
A. B., Hedding College, Scholar in Latin.
Stebbins, Millicent.....Omaha, Neb.
A. B., University of Nebraska, Fellow in German.
Stephenson, Edward Beattie.....Sparta
B. S., M. S., Knox College, Fellow in Physics.
Strand, Carl John.....Brattleboro, Vt.
A. B., Augustana College, Scholar in Economics.
Werckshagen, Paul Eberhard,.....St. Louis, Mo.
Graduate of Gymnasium, Schwedt, Germany,
Scholar in Modern Languages.

OTHER GRADUATE STUDENTS

The major subject of study is specified after the name of each student.

Abrams, Duff Andrew.....Murphysboro
B. S., University of Illinois, Civil Engineering.

Allison, Harry Orson.....Alpha
B. S., University of Illinois, Economics.
Amrine, Thomas Hamer.....Vermont
B. S., University of Illinois, Electrical Engineering.
Beard, Abner Hamilton,.....Wynne, Ark.
B. C. E., University of Arkansas, Municipal and Sanitary Engineering.
Bench, Albert Rittscher.....Galena
B. S., University of Illinois, Mechanical Engineering.
Birdsall, Lewis Isaac.....Patterson, N. Y.
A. B., Williams College, Chemistry.
Blaisdell, Daisy Luana.....Chicopee Falls, Mass.
A. B., and A. M., Smith College, German.
Bradford, Bernice Margaret..... Sycamore
A. B., University of Michigan, German.
Briscoe, Charles Francis.....Urbana
A. B., Indiana University, A. M., University of Illinois, Botany.
Busey, Marietta Ruth.....Urbana
A. B., Vassar College, Psychology.
Carman, Maude W. S.....Urbana
A. B., Wellesley College, History.
Carscallen, George Ernest.....Frankfort, Ind.
A. B., Wabash College, Mathematics.
Center, Orlo Dorr.....Champaign
B. S., University of Illinois, Agronomy.
Chiles, James Alburn.....Urbana
A. B., Central College, A. M., Vanderbilt University, LL. B. Berlin University, German.
Clark, Samuel C.....Urbana
B. S., University of Chicago, Chemistry.
Clark, Vinton Albert.....Champaign
B. S., University of Vermont, M. S., University of Vermont, Philosophy.
Coffey, Walter Castella .....Urbana
B. S., University of Illinois, Animal Husbandry.
Crosthwait, George Ashley.....Urbana
B. S., University of Illinois, Botany.
Davis, Grant Train.....Urbana
A. B., University of Michigan, Chemistry.

DeMotte, Ruby Thorne..... Urbana
A. B., University of Illinois, Botany.
Denton, William Wells.....Detroit, Mich.
A. B., University of Michigan, Mathematics.
Dick, Carl Rankin..... .....Bloomington
B. S., University of Illinois, Architectural Engineering.
Dunkin, William Van..... ....Urbana
B. S., University of Illinois, Mechanical Engineering.
Eckhardt, William George..... .....Buffalo Prairie
B. S., University of Illinois, Chemistry.
Emmett, Arthur Donaldson.....Kansas City, Mo.
B. S., A. M., University of Illinois, Animal Chemistry.
Emmons, Clyde Wilbur.. .....Champaign
A. B., Albion College, Mathematics.
Engstrom, Roy Victor.....St. Paul, Minn.
B. S., University of Illinois, Civil Engineering.
Ernest, Thomas Reuben.....Swanwick
A. B., University of Illinois, Chemistry.
Ewing, Henry Ellsworth.....Arcola
A. B., University of Illinois, Entomology.
Fawcett, Mrs Mary E.... .....Columbus, O.
A. B., Ohio State University, English.
Forsyth, Chester H.....Trafalgar, Ind.
A. B., Butler College, Mathematics.
Garlough, Carlton D.....Stanford
Ph. B., Hillsdale College, A. B., and A. M.
Gernert, Walter Byron.....McPherson, Kans.
B. S., Kansas State Agric. College, Agriculture.
Gibbs, Charlotte Mitchell.....Champaign
A. B., University of Illinois, Household Science.
Gilbert, John Philo..... .....Urbana
A. B., University of Illinois, Entomology.
Gill, Frederic Williams..... .....Urbana.
B. S., University of Illinois, Animal Chemistry.
Goff, Mary Emma.....Champaign
A. B., University of Illinois, English.
Gore, Adolph..... Marion
A. B., University of Illinois, Political Science.
Greaves, Joseph Eames.....Logan, Utah
B. S. Utah Agricultural College, Agronomy.

Greene, Elizabeth Grosvenor.....Champaign
A. B., B. L. S., University of Illinois, Philosophy.
Gustafson, Axel Ferdinand ....Aledo
B. S., University of Illinois, Botany.
Hachmeister, Henry William.....Chicago
B. S., University of Illinois, Chemistry.
Hammond, James Weston.....Urbana
B. S., Ohio State University, Animal Husbandry.
Harbarger, Sada Annis..... ..Columbus, Ohio
A. B., Ohio State University, English.
Hayden, Cassius Clay..... .....Urbana
B. S., Ohio State University, Dairy Husbandry.
Hellmann, Carl August .....Chicago
B. S., University of Illinois, Electrical Engineering.
Hill, Alva J. ..... Urbana
A. B., Ohio State University, Economics.
Hilmer, William Charles.....Urbana
A. B., A. M., German Wallace College, German.
Hinds, Sherwood.....Stanton, Mich.
B. S., Michigan Agricultural College, Mathematics.
Howe, Paul Edward.....Urbana, Ill.
A. B., University of Illinois, Chemistry.
Hummel, Adam Albert.....Urbana
B. S., University of Illinois, Botany.
Iida, Yoshifusa.....Tokio, Japan
G. Agr. Tokio Imperial University, Animal Husbandry.
James, Leonard Vaughan.....Amboy
B. S., University of Illinois, Electrical Engineering.
Johnson, Charles Sunderland.....La Grange
B. S., University of Illinois, Mechanical Engineering.
Kean, Hugh Pratt..... .....Urbana
A. B., Albion College, Mathematics.
Keeler, Fred Crosby.....Belvidere
A. B., University of Illinois, History.
Kerr, Josephine.....Urbana
B. S., University of Illinois, Bacteriology.
Latzer, Lenore Lydia..... ....Highland
A. B., University of Illinois, M. S., University of Michigan, Bacteriology.
Leverett, Warren Hamilton..... .....Upper Alton
B. S. and M. S., Shurtleff College, Chemistry.

Lewis, Byron Ray .....Bridgeport
A. B., University of Illinois, History.
Long, Roy Harold .....Lexington
B. S., University of Illinois, Horticulture.
McConn, Charles Maxwell.....Minneapolis, Minn.
A. B., and A. M., University of Minnesota, English.
McCrory, Grover Cleveland,..... .McCrory, Ark.
B. C. E. University of Arkansas, Municipal and Sanitary Engineering.
McLaughlin, Edna Mildred.....Galesburg
A. B., University of Illinois, French.
Maddox, Wilbur Clinton.....Galva
B. S., University of Illinois, Electrical Engineering.
Manuel, Earle V.....Minneapolis, Minn.
B. S., University of Minnesota, Chemistry.
Mathews, Roberts Maurice.....Indianapolis, Ind.
B. S., Butler College, Mathematics.
Mattill, Henry Albright. .....Leavenworth, Kan.
A. B. and A. M., Western Reserve University, Chemistry.
Merrill, Amos Newlove.....Logan, Utah
B. S., Agricultural College of Utah, Agronomy.
Montooth, Charles Stuart .....Toulon
A.B., University of Illinois.
Mumford, Herbert Windsor.....Urbana
B. S., Michigan Agricultural College, Agricultural Economics.
Myers, Clyde Hadley,.....Bloomington
B. S. Illinois Wesleyan University, Agronomy.
Nichol, Josephine Shepardson.....Urbana
A. B., Denison University, German.
Nuttall, John Tilden.....Urbana
B. S., Northwestern, Chemistry.
Palmer, George Merit.....Champaign
A. B., University of Illinois, History.
Ponzer, Earnest William.....Henry
B. S., University of Illinois, Mathematics.
Porter, Francis Marion.....Circleville, Ohio
B. S., Ohio University, Physics.
Reed, Susan Martha.....Westfield, Mass.
A. B., Mt. Holyoke, History.

Roark, Ruric Creegan.....Richmond, Ky.
A. B., University of Cincinnati, Chemistry.
Roberts, Kathleen Alice.....Champaign
A. B., University of Illinois, English.
Rogers, Jerome Stanley..... .....Honeoye Falls, N. Y.
B. S., Syracuse University, Chemistry.
Rutherford, Thomas Arthur .....Carbondale, Pa.
M. D., Penn., B. S., M. S., Princeton Univ., Chemistry,
Sandifur, Claude Williamson.....Champaign
Physics
Schmidt, Violet Jayne..... .....Urbana
A. B., University of Michigan, A. M., University of Minnesota, Sociology.
Shaw, Hazel Yearsley.....Urbana
A. B., University of Illinois, History.
Sim, Keturah Elizabeth..... .....Urbana
B. L., M. L., University of Illinois, English.
Smith, James Elmo .....Urbana
B. S., University of Illinois, Civil Engineering.
Steele, Ava D..... ....Marshall, Mo.
A. B., Missouri Valley College, A. M., University of Missouri, English.
Stempel, Waldemar M..... ..... Urbana
A. B., Indiana University, Physics.
Stifler, William Warren.....Upper Alton
A. B., Shurtleff College, Physics.
Stuhlmann, Otto.....Cincinnati, O.
A. B., University of Cincinnati, Physics.
Stull, Ray Thomas.....Elkland, Pa.
E. M. in Ceramics, Ohio State University, Chemistry.
Tanquary, Maurice Cole.....Champaign
A. B., University of Illinois, Entomology.
Van Doren, Carl Clinton.....Urbana
A. B., University of Illinois, English.
West, James Alexander.....Champaign
B. S., Illinois Wesleyan, A. M., Boston University, Zoölogy.
Wheeler, Wilfred Forrest ....Urbana
Chemistry.
White, Marion Ballantyne .....Champaign
Ph. B., University of Michigan, Mathematics.

Willis, Clifford..... Champaign
B. S., University of Illinois, Agronomy,
Wilson, Harley, F.....Victor, Colo.
B. S., Colorado Agricultural College, Entomology.
Wright, Lora.....Urbana
A. B., Smith College, History.
Yeck, Charles Walter..... .....Flora
A. B., University of Illinois, Physiology.

The following graduate students are studying *in absentia.*
Abrams, Duff Andrew.....Murphysboro
B. S., University of Illinois, Civil Engineering.
Anders, Edwin.....Newark
B. S. University of Illinois, Sociology.
Archer, Arthur Ward..... .....Little Rock, Ark.
B. S. University of Illinois, Architecture.
Armstrong, Charles Edward.....Danville
Electrical Engineering.
Baker, Howard Newell.....Homer
A. B., University of Illinois, M. D., Hahnemann Medical College,
Psychology.
Buchanan, John Lee.....Schenectady, N. Y.
B. S. University of Illinois, Electrical Engineering.
Bullard, Benjamin Franklin.....Chicago
B. L., University of Illinois, History.
Carr, Maurice L..... ....Avon
B. S., University of Illinois, Electrical Engineering.
Cresap, Ernest Wilfred..... .....Coshocton, O.
A. B., University of Illinois, English.
Davis, John Wolfersperger.....Chicago
B. S., University of Illinois, Civil Engineering.
Eddy, Clarence Leroy.....Weldon, Ia.
B. S., University of Illinois, Civil Engineering.
Fiske, Clarence Wilson.....Moline
B. S., University of Illinois, Mechanical Engineering.
Fucik, Edward James.....Chicago
B. S., University of Illinois Civil Engineering.
Gaston, Newton David.....Moline
B. S., University of Illinois, Mechanical Engineering.
Gay, Mary Louise..... .....Rockport
A. B., University of Illinois, Modern Languages.

Gutmann, Ludwig.....St. Louis, Mo.
B. S., University of Illinois, Electrical Engineering.
Harmon, Ivan Guy.....Effingham
B. S., University of Illinois, Civil Engineering.
Hillman, Frank William.....Chicago
B. S., University of Illinois, Civil Engineering.
Hoppin, Charles Albert.....Milwaukee, Wis.
B. S., University of Illinois, Mechanical Engineering.
Howell, Leslie Dillon.....Opava
B. S., University of Illinois, Architecture.
Ireland, Washington P.....Chicago
B. S., University of Illinois, Civil Engineering.
Janssen, Otto.....Los Angeles, Cal.
B. S., in Architecture University of Illinois, Architecture.
Jensen, J. Norman.....Chicago
B. S., University of Illinois, Civil Engineering.
Knapp, Willard Alfred.....Farmer City
B. S., University of Illinois, Civil Engineering.
Knowlton, William David.....Chicago
A. B., University of Illinois, Electrical Engineering.
Marquis, Franklin W.....Bloomington
B. S., University of Illinois, Mechanical Engineering.
Mathews, Robert Clayton.....Champaign
B. S., University of Illinois, Mechanical Engineering.
Maxwell, Wymer Washington.....Charleston
B. S., University of Illinois, Architecture.
Meier, William.....Chicago
B. S., University of Illinois, Civil Engineering.
Myers, Elmer James.....Belleville, Kans.
Graduate Kansas State Normal School, Psychology.
Poirot, Alois Phillip.....Belleville
B. S., University of Illinois, Civil Engineering.
Post, Raebern Henry.....Champaign
B. S., University of Illinois, Mechanical Engineering.
Randall, Frank Alfred.....Chicago
B. S., University of Illinois, Civil Engineering.
Robinson, Ward Reid.....Springfield
B. S., University of Illinois, Civil Engineering.
Sargent, Charles Elliotte.....Chicago
B. S., University of Illinois, Mechanical Engineering.

Sawyer, George Loyd.....Chicago
B. S., University of Illinois, Mechanical Engineering.
Schutt, Alfred George.....Belleville
B. S,, University of Illinois, Civil Engineering.
Seymour, Budd Willard.....Dwight
B. S., University of Illinois, Civil Engineering.
Shepardson, Ralph Steele.....Aurora
B. S., University of Illinois, Architecture.
Slocum, Roy Harley.....Urbana
B. S., University of Illinois, Civil Engineering.
Smith, George Russell.....Elkhart, Ind.
B. S., University of Illinois, Mechanical Engineering.
Stone, Mildred A. B.....Bloomington
A. B., University of Illinois, Psychology.
Swanberg, Floyd Ludwig.....Cincinnati, O.
B. S., University of Illinois, Mechanical Engineering.
Thayer, William Sumner.....Chicago
B. S., University of Illinois, Electrical Engineering.
Trimble, Clara Eugenia.....Champaign
A. B., University of Illinois, History.
Weeks, Harry William.....Jackson, Mich.
A. B., Lombard College, B. S., University of Illinois, Mechanical Engineering.
Zimmerman, Walter Herman.....Champaign
B. S., University of Illinois, Mechanical Engineering.

UNIVERSITY OF ILLINOIS

THE STATE UNIVERSITY

THE UNIVERSITY INCLUDES THE

COLLEGE OF LITERATURE AND ARTS (Ancient and Modern Languages and Literatures, Philosophical and Political Science Groups of Studies, Economics, Commerce and Industry).

COLLEGE OF ENGINEERING (Architecture, Civil Engineering, Municipal and Sanitary Engineering, Electrical Engineering, Mechanical Engineering, Railway Engineering).

COLLEGE OF SCIENCE (Astronomy, Botany, Chemistry, Geology, Mathematics, Physics, Physiology, Zoölogy).

COLLEGE OF AGRICULTURE (Animal Husbandry, Agronomy, Dairy Husbandry, Horticulture, Veterinary Science, Household Science).

COLLEGE OF LAW (Three years' course).

COLLEGE OF MEDICINE (College of Physicians and Surgeons, Chicago).

COLLEGE OF DENTISTRY (Chicago).

SCHOOLS—COMMERCE, EDUCATION, MUSIC (Voice, Piano, Violin) **LIBRARY SCIENCE, PHARMACY,** (Chicago), **RAILWAY ENGINEERING AND ADMINISTRATION,** and the **GRADUATE SCHOOL.**

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